1897-98

PROCEEDINGS
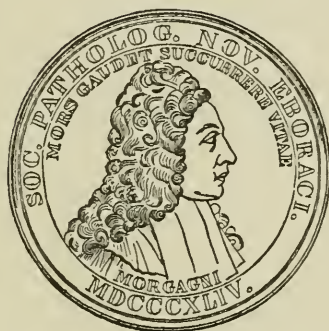
OF THE

NEW YORK

PATHOLOGICAL SOCIETY

FOR THE YEARS 1897 AND 1898

Organized in 1844   Incorporated in 1886

PRINTED FOR THE SOCIETY
1899

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* Dr. John A. Swett,	1844
* Dr. Willard Parker,	1845, 1846, 1847
* Dr. James R. Wood,	1848, 1857
Dr. T. M. Markoe,	1850, 1879
* Dr. W. H. Van Buren,	1850
* Dr. Charles E. Isaacs,	1851
Dr. John T. Metcalfe,	1852
* Dr. Henry Van Arsdale,	1853
* Dr. Jackson Bolton,	1854, 1855
* Dr. Robert Watts,	1856
* Dr. Edmund R. Peaslee,	1858
* Dr. John C. Dalton,	1859
* Dr. Alfred C. Post,	1861
* Dr. Thomas C. Finnell,	1862
* Dr. David S. Conant,	1863
Dr. Abraham Jacobi,	1864
* Dr. Gurdon Buck,	1865
* Dr. Henry B. Sands,	1866
* Dr. William B. Bibbins,	1867
* Dr. Ernest K. Krackowitzer,	1868
Dr. L. A. Sayre,	1869
* Dr. Joseph C. Hutchinson,	1870
* Dr. A. L. Loomis,	1871, 1872
* Dr. Erskine Mason,	1873
Dr. Herman Knapp,	1874
Dr. Francis Delafield,	1875
Dr. Charles K. Briddon,	1876
Dr. Edward G. Janeway,	1877
* Dr. John C. Peters,	1878
Dr. Edward L. Keyes,	1879
Dr. T. E. Satterthwaite,	1880, 1881
* Dr. E. C. Seguin,	1882

* Deceased.

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Dr. George F. Shrady,   1883, 1884
Dr. John A. Wyeth,   1885, 1886
Dr. T. Mitchell Prudden,   1887
Dr. W. P. Northrup,   1888, 1889
* Dr. J. West Roosevelt,   1890
Dr. Hermann M. Biggs,   1891
Dr. H. P. Loomis,   1892, 1893
Dr. G. C. Freeborn,   1894
Dr. George P. Biggs,   1895
Dr. John Slade Ely,   1896, 1897
Dr. T. Mitchell Prudden,   1898

SECRETARIES.

* Dr. William C. Roberts,   1844 to 1849
* Dr. H. D. Buckley,   1849
* Dr. Henry G. Cox,   1850 to 1852
* Dr. William Henry Church,   1852
* Dr. Charles M. Allen,   1852 to 1853
* Dr. George T. Elliott,   1853 to 1854
* Dr. J. Foster Jenkins,   1854 to 1855
* Dr. E. Lee Jones,   1855 to 1861
Dr. T. Gaillard Thomas, *pro tem.*,   1855
Dr. Henry D. Noyes, *pro tem.*,   1858
Dr. George F. Shrady,   1861 to 1879
* Dr. Wesley M. Carpenter,   1880 to 1888
Dr. Walter Mendelson,   1889
Dr. T. L. Stedman,   1889 to 1891
Dr. Ogden C. Ludlow,   1891 to 1898
                      * Deceased.

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MEMBERS OF THE SOCIETY.

1879   Chambers, Potter Flewellen.........24 East 54th Street
1887   Cheesman, Timothy Matlack.........46 East 29th Street
1891   Coleman, Warren....................5 West 30th Street
1893   Coley, William B......................5 Park Avenue
1895   Conner, Lewis A...................48 West 49th Street
1898   Cordes, Louise....................46 East 49th Street
1891   Currier, Charles Gilman...........313 West 102d Street
1877   Cushier, Elizabeth M..............53 East 20th Street

1884   Dawbarn, Robert H. M............105 West 74th Street
1880   Delavan, D. Bryson..................1 East 33d Street
1896   Denton, Myron Preston.............33 East 33d Street
1884   Dixon, George A...................15 West 49th Street
1889   Dowd, Charles N..................135 West 73d Street
1889   Dunham, Edward K..... ....338 East 26th Street

1880   Edebohls, George M...............59 West 49th Stree
1888   Elliott, George T....... ....36 East 35th Street
1883   Elliott, George R....... ....48 East 26th Street
1893   Ewing, James.....................260 West 57th Street

1882   Ferguson, Frank...................20 West 38th Street
1895   Fischer, Charles S..............201 West 118th Street
1889   Fisher, Edward D.................42 West 45th Street
1895   Fitzpatrick, Charles B.........76 Rush Street, Brooklyn
1892   Fordyce, John A......................66 Park Avenue
1885   Freeborn, George C..............215 West 70th Street
1888   Freeman, Rowland Godfrey........205 West 57th Street
1892   Fuller, R. M.....................136 West 42d Street

1874   Gibney, Virgil P.....................16 Park Avenue
1889   Grauer, Frank...................333 West 46th Street

1887   Hamilton, C. S....142 East Long Street, Columbus, Ohio
1899   Hart, Theodore Stuart.............77 West 50th Street
1896   Heiman, Henry...................56 West 120th Street
1878   Heineman, Henry N...............62 West 51st Street
1884   Henry, Nelson H...................14 East 10th Street
1889   Herter, Christian A..............819 Madison Avenue
1886   Hodenpyl, Eugene................143 West 73d Street

1897   Holder, Oscar H ....27 West 44th Street
1882   Holt, L. Emmett...................14 West 55th Street
1893   Huddleston, John H..............126 West 85th Street
1894   Hudson, Walter G.................73 West 131st Street

1880   Jackson, Frank W..................12 West 18th Street
1872   Jacobi, Mary Putnam ....110 West 34th Street
1896   James, Robert C....................5 West 30th Street
1887   James, Walter B.... ....17 West 54th Street
1898   Janeway, Theodore C..............36 West 40th Street
1894   Jeffries, Ferdinand M.............821 East 165th Street
1889   Johnson, Alexander B..............12 East 58th Street
1887   Jones, Mary A. D.................249 East 86th Street
1875   Jones, S. Seabury.................712 Madison Avenue
1879   Judson, Adoniram B................1 Madison Avenue

1887   Kilham, Eleanor B................121 East 35th Street
1875   Kipp, Charles J.........534 Broad Street, Newark, N. J.
1898   Knapp, Arnold....................26 West 50th Street
1891   Kneer, Ferdinand G...............236 West 51st Street
1884   Knight, Charles H...............147 West 57th Street
1889   Koerner, C. F..........................113 7th Street

1893   Lambert, Alexander...............125 East 36th Street
1879   Lange, Fred.....................130 East 61st Street
1896   Larkin, John Henry.............498 West 130th Street
1871   Leale, Charles A.................604 Madison Avenue
1896   Leaming, Edward.................117 West 84th Street
1883   LeBoutillier, William G.............49 West 50th Street
1891   LeFevre, Egbert...................52 West 56th Street
1898   Levene, Phœbus A.............1692 Lexington Avenue
1898   Levin, Isaac.....................1626 Madison Avenue
1898   LeWald, Leon T................436 Lexington Avenue
1898   Lewis, Charles H..... ....28 West 61st Street
1880   Lewis, Daniel....................252 Madison Avenue
1878   Liautard, A. F...................141 West 54th Street
1889   Linsley, J. H.........................Burlington, Vt.
1885   Lockwood, George Roe, Jr..........44 West 49th Street

1885   Loomis, H. P.....................58 West 34th Street
1890   Ludlow, Ogden Curtis.............2309 Seventh Avenue
1889   Lynch, John B...................148 West 22d Street
1888   Lynde, George S.................326 West 45th Street

1889   MacHale, Ferdinand S............317 East 77th Street
1891   McAlpin, D. Hunter, Jr..............9 East 55th Street
1879   McBurney, Charles................28 West 37th Street
1876   McCreery, John A..................20 West 54th Street
1878   McNutt, Sarah J.................265 Lexington Avenue
1895   Mandelbaum, F. S................717 Madison Avenue
1881   Mandeville, H. A........................150 Broadway
1884   Markoe, Frances H................15 East 49th Street
1889   Markoe, J. W.....................12 West 55th Street
1898   Mathews, F. S....................77 West 50th Street
1878   Mayer, Abraham...................40 East 60th Street
1897   Mercelis, Elizabeth................53 East 20th Street
1886   Meyer, Willy....................700 Madison Avenue
1874   Moeller, Henry...................341 West 57th Street
1898   Moschcowitz, Alexis V.............350 West 58th Street
1890   Mowry, Eugene C..................355 West 42d Street
1887   Myers, T. Halsted.................24 West 50th Street
1892   Myles, Robert C..................46 West 38th Street

1872   Nicoll, Henry D....................51 East 52d Street
1896   Nicoll, Matthias, Jr..............126 West 58th Street
1894   Norrie, Van Horne................21 West 37th Street
1896   Norris, Charles...................23 East 39th Street
1883   Northrup, William P................57 East 79th Street
1895   Noyes, William B ....28 West 61st Street

1881   Offenbach, Robert ....46 East 60th Street
1888   Otis, William K.....................5 West 50th Street

1893   Park, William Hallock.............315 West 76th Street
1876   Partridge, Edward L..................19 Fifth Avenue
1886   Peterson, Frederick..................4 West 50th Street
1898   Phillips, Carlin ....340 East 26th Street
1874   Polk, William M.....................7 East 36th Street

1878   Porter, William H........................1674 Broadway
1893   Power, Henry.......................Montclair, N. J.
1883   Prudden, T. Mitchell..............437 West 59th Street
1887   Pryor, William Rice...............121 East 38th Street

1889   Reyling, F. T.....................139 East 44th Street
1884   Rice, Clarence C..................123 East 19th Street
1881   Robinson, A. R....................248 West 42d Street

1891   Sachs, B..........................21 East 65th Street
1874   Satterlee, F. LeRoy................8 West 18th Street
1872   Satterthwaite, Thomas E...........47 West 47th Street
1887   Sayre, Reginald H..................285 Fifth Avenue
1897   Schultze, Otto H..................166 East 64th Street
1890   Seaman, Louis L...................18 West 31st Street
1887   Sellew, Frederick S................61 East 79th Street
1895   Shelby, Edmond P., Jr..............18 West 32d Street
1899   Smith, Ernest Ellsworth............262 Fifth Avenue
1894   Sondern, Frederic E...............200 West 56th Street
1893   Southworth, Thomas S..............47 West 56th Street
1889   Spitzka, E. C......................66 East 73d Street
1888   Stedman, Thomas L.................53 East 56th Street
1898   Stein, Richard...................811 Lexington Avenue
1872   Stimson, Daniel M.................11 West 17th Street
1894   Stone, William S..................260 West 57th Street
1880   Swasey, John H....................34 East 28th Street

1883   Taylor, Henry Ling.................71 West 55th Street
1886   Thacher, John Seymour.............33 West 39th Street
1896   Thelberg, John....................26 West 34th Street
1893   Tuttle, George A..................237 West 44th Street

1896   Valadier, Charles A...............130 East 64th Street
1888   Van Cott, J. M.............188 Henry Street, Brooklyn
1886   Van Gieson, Ira...................437 West 59th Street
1882   Van Santvoord, Richard. ....106 West 122d Street
1885   Van Schaick, George Graf..........23 West 37th Street

1883   Wackerhagen, G..........23 Seventh Avenue, Brooklyn

During the Years 1897 and 1898
the following Members were lost to
the Society through Death

J. E. Culver
M. J. B. Messemer
R. C. M. Page
E. C. Seguin
J. C. Smith
William Vissman

PROCEEDINGS

New York Pathological Society.

Stated Meeting, February 10, 1897.

John Slade Ely, M.D., President.

ADVANTAGES OF FORMALIN AS A PRESERVATIVE OF GROSS ANATOMICAL SPECIMENS.

Dr. Larkin said that in preserving specimens in the gross for cabinet purposes it was very desirable to keep the natural color, as far as possible. Alcohol, the time-honored preservative fluid, bleached the tissues, so that, for instance, a thrombus would turn white, and after a considerable time would be for the most part destroyed. If fresh specimens were dried in the air for an hour or two, and were then immersed in a two to five per cent. solution of formalin, and left in that for any convenient time less than a week, it would be found that they could be permanently preserved in ninety-five per cent. alcohol, and that the normal color of the structure of the organs and of the blood, would be preserved. For microscopical use it was better to use a mixture of Müller's fluid and formalin.

To illustrate the advantages of this method, Dr. Larkin exhibited a specimen showing thrombosis of the pulmonary artery. The color of the thrombus had been preserved

quite well, and the endothelial lining of the pulmonary artery and the color of the lung had also been preserved.

Dr. LARKIN then exhibited the dura mater from a case of

CHRONIC HEMORRHAGIC PACHYMENINGITIS.

The patient was a German who, for three weeks prior to admission to the hospital, had suffered continuously from headache and insomnia. For the last two days he had been semi-comatose. On the afternoon of the day of admission he became comatose. He had previously complained of the sensation of a heavy weight on the head. After ten days of this coma he died. On opening the cranium, the dura mater appeared very dark, and on removing it, it was found that there was a chronic pachymeningitis. The blood-vessels underneath the dura were very full of blood.

Dr. LARKIN next presented specimens from a case of

CHRONIC PACHYMENINGITIS,

removed from a man, forty years old, who had been sick for five months previous to admission. One week before coming to the hospital he had five fits. After entering the hospital he became semi-comatose, and remained in that condition for about a week. He then had ten convulsions within twenty-four hours, after which he passed into coma and died at the end of six hours. At the autopsy, the greater portion of the brain was found to be covered with a large effusion of blood. At the right temporo-sphenoidal lobe was a large depression, and just above this, and near the occipital lobe, a second depression. The corresponding dura mater on that side presented a large clot which fitted accurately into the depression on the brain surface. The speaker remarked that a more careful clinical record of this case, made by a competent neurologist, would have probably added to our scanty knowledge of the functions of the temporo-sphenoidal lobe. The man was a syphilitic,

and had well-marked endarteritis at the base of the brain
and in the coronary arteries.

Dr. LARKIN then presented specimens from a case of   .

RUPTURE OF THE LIVER.

The patient, a young man of twenty-two, had been in-
jured by being struck by a heavy box, and thrown into an
area.   A depressed fracture of the skull caused his death a
few hours later.   In addition to the injuries to the skull,
the autopsy revealed several quarts of blood fluid in the
abdominal cavity, with some clots, and further examination
showed a large rupture of the liver.   There was no fracture
of the ribs or of the vertebræ.

Discussion.

Dr. MANDLEBAUM said that after trying various methods
for preserving anatomical specimens for museum purposes,
he had recently adopted and could now recommend the fol-
lowing method: Fresh specimens should be subjected to
formalin vapor for twenty-four hours; then, without com-
ing in contact with water, they should be placed in ninety-
five per cent. alcohol for twenty-four or forty-eight hours.
They could then be transferred to a strong solution of
acetate of potash in equal parts of glycerine and water, and
kept indefinitely in that solution.   For exposing the speci-
mens to the formalin vapor, it was convenient to use a large
museum jar, in which was placed some absorbent cotton
moistened with a forty per cent. solution of formalin.   The
alcohol could be used several times.   The formalin at first
bleaches the specimen slightly, but the alcohol restores the
color and brings out the blood perfectly.   After this the
specimen did not undergo any further change.   He had
succeeded in preserving some specimens which were in all
respects as good as when perfectly fresh.   Another plan
was to place the specimen first in a solution of formalin,
instead of exposing it to the vapor, but, according to his

experience, this method was much inferior to the one first described.

Dr. J. S. ELY said that about a year ago a few specimens of intestine had been treated by this method—although he did not recall whether formalin solution or vapor had been used,—and while the results obtained with it at the laboratory of the College of Physicians and Surgeons had been at first very satisfactory, the specimens had been noticed to deteriorate in the glycerine. Glycerine was always an objectionable fluid, for the reason that it made the specimens so transparent. He was also skeptical regarding the method just advocated by Dr. Larkin. Although the specimen presented looked well now, he felt pretty sure that in the course of six months a great deal of the color would have left the clot, and in a year or two the color would have almost entirely gone. He had preserved quite a number of specimens by placing them first in formalin, and then in strong alcohol. He had been delighted with the results at first, but the color had faded within two years. He had tried the plan of drying the surface before immersing the specimen in alcohol, and for a year or more the color had been well preserved, but it was now fading from the specimens so treated.

Dr. LARKIN said that he had noticed that the potash also seemed to make the specimens very brittle, so that they could be handled with difficulty. The color of the specimen just exhibited by him had not faded perceptibly in two months.

A NEW GANGLION-CELL STAIN.

Dr. E. S. STEESE, present by invitation, exhibited several specimens under the microscope to illustrate a new combination ganglion-cell stain. The stain, he said, was essentially a modification of the Nissl stain, but consisted of two fluids instead of one. The method of its application was like that of the Nissl stain. The tissues should be cut into small pieces, and should be fixed, hardened, embedded, and

cut in the usual manner.   Corrosive sublimate and formalin, two per cent., and absolute alcohol seemed to be the best of the fixing solutions.   If formalin were used, the specimen should be left in contact with it for at least forty-eight hours.   The staining solution consists of two parts of a one per cent. aqueous solution of methyl blue, and six parts of a saturated aqueous solution of fuchsin.   After combining these two solutions, the mode of procedure is the same as with the Nissl stain.   Only a few sections should be placed in a watch-glass, two-thirds full of the fluid.   This should be heated until vapor is noticed to come from the surface.   It should then be set aside for not more than one minute to cool.   The sections should next be immediately transferred to 95 per cent. alcohol. The differentiation and dehydration take place very rapidly. The specimens would become very white generally in one or two minutes.   When that was the case, they should be immediately transferred to some clearing solution, preferably oil of bergamot or oil of origanum. The latter he preferred.   The mounting solution he had used was balsam, but damar also answered very well.   The only advantage over the Nissl stain was that it seemed to give more character to the Nissl bodies, making them stain a deep purple instead of a greenish-blue.   The neuraxons take a very pale violet, but they can be readily traced for a considerable distance, and within them the Nissl bodies can be easily traced.   The nuclei stain a pale violet.   The nucleoli stain usually a rather brilliant red ; the pigment granules also stain red.   The surrounding sustentacular tissue remains absolutely colorless.   The round cells, for the most part, stain red, although occasionally blue.   The stain was also a very good one for cellular work, contrasting very well with eosin.   Certain accidental observations had led him to think that it was possible that by proper dehydration the neuraxons could be stained a decided red.

Dr. LARKIN asked if this were a combination of the two methods described by Nissl—the fuchsin and the methyl-blue method.

Dr. STEESE replied that it might be called so, but Nissl uses these two stains separately.

Dr. LARKIN remarked that in clearing up the Nissl stain the oil of origanum did not work very well.

A NEW AND INEXPENSIVE MICROTOME.

Dr. SIDNEY YANKAUER, present by invitation, exhibited his new microtome. He said it was not a modification of any old instrument, but was constructed on principles which, so far as he knew, were novel in microtomes. In the Thoma instrument the knife moved in a slide, and the edge of the knife, considered as a line, described in successive cuts the same plane. The specimen was moved up through this plane a distance represented by the thickness of the section to be cut. In his instrument, the specimen remained stationary, but the plane in which the knife moved was continually lowered. The instrument consisted of two parts—a stand and a sliding piece. The stand consists of a triangular piece of metal, across the base of which a piece of glass is fixed. Near this are a perforation and a vertical rod. On top of the latter is the ordinary clamp for holding the specimen. At the apex of the triangle is a small elevation, and at the top of this elevation a hole, one-eighth of an inch in diameter, and one-eighth of an inch deep. This hole is made hemispherical at the bottom, and is so placed that the bottom of the hole is in the same plane as the surface of the glass, so that if the surface of the glass were prolonged into a plane, this would just touch the bottom of the hole. The sliding piece is made of a piece of metal (e, f, g) bent at a right angle, and having at its angle and at either end a perforation through which passes a screw. These three screws have the same sized screw-threads, are pointed at the ends, and capped by small spheres, one-eighth of an inch in diameter. The screw at the end of the long arm of the sliding piece carries a plate on its upper end which is divided into one hundred parts. This screw corresponds to the micrometer screw of the ordinary microtome. On this long arm

of the sliding piece is the screw (l), by means of which the knife (h, Fig. 1) is fastened in such a position that it is parallel to the short arm of the sliding piece. As the screws are of the same length, the edge of the knife must be parallel to a line joining the points of the two screws on the short arm. The small sphere at the end of the micrometer
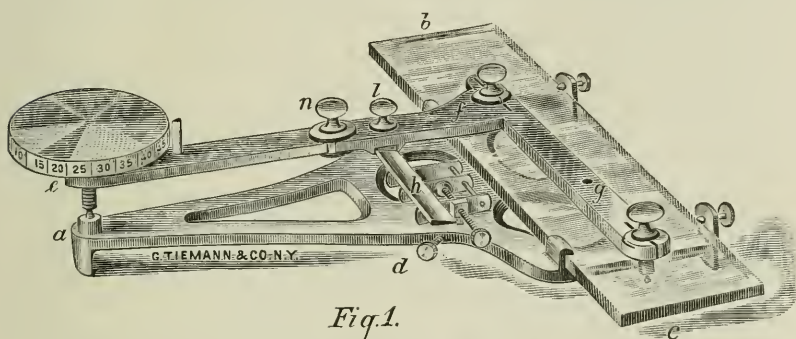

Fig. 1.
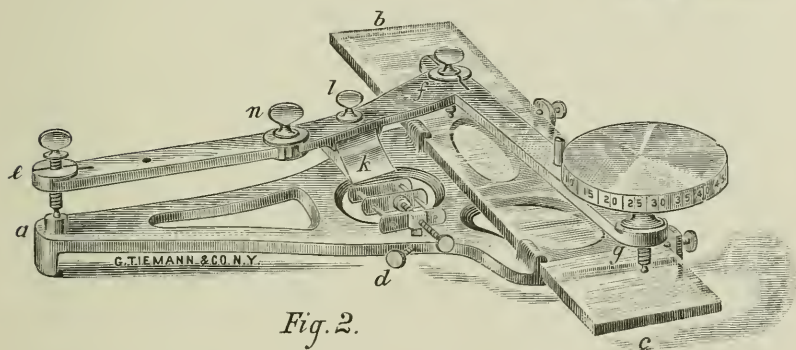
Fig. 2.

screw fits into a little hole on the top of the elevation, and the two other spheres rest on the glass plate. By sliding the piece along the glass plate, the knife moves across the specimen. After being moved back again, the micrometer screw is rotated to the left. This lowers the end of the long arm of the sliding piece, and in so doing lowers the knife a certain distance. Then another cut is made, and the knife being now in a lower position, must cut through the specimen at a lower point.

The speaker said that an important practical question in connection with this instrument was whether the sections had parallel surfaces or were wedge-shaped. The demonstration of the parallelism of the sections was as follows : Imagine a plane passing through the three points of the instrument, and call that plane the plane of the screw-points. The edge of the knife is so situated that it is parallel to a line joining the upper two screw-points (f, g, Fig. 1). Being a line parallel to a line in a plane, it is a parallel to the plane itself, and therefore the edge of the knife is parallel to the plane of the screw-points. It is immaterial in what position the micrometer screw is, for, whether lowered or raised, the edge of the knife is always parallel to the line joining the points of the screws on the short arm. If the sliding piece be placed upon the stand, the three points rest in the plane of the glass, because the bottom of the hole is in the plane of the glass ; hence the plane of the screw-points and the plane of the glass must coincide, and whatever is true of the plane of the screw-points is true of the plane of the glass. Inasmuch as the edge of the knife is parallel to the plane of the screw-points, it is parallel to the plane of the glass. In making the sliding motion along the glass plate, the edge of the knife remains at a constant distance from the plane of the glass ; for its distance from the plane of the screw-points is fixed by the micrometer screw. The edge of the knife, considered as a line moving over a plane to which it is parallel, and from which it remains a constant distance, must describe a plane parallel to the plane of the glass. Now, when the micrometer screw is turned so as to lower the long end of the sliding piece, and in that way lower the knife, the parallelism of the edge of the knife to the plane of the screw-points is not altered, but the edge is nearer the plane of the screw-points, and, therefore, nearer the plane of the glass than before. Having fixed the knife in its new position, the same conditions must be true as previously, that is, the edge of the knife must describe a second plane, parallel to the plane of the glass. As two planes parallel to a

third plane are parallel to each other, the section which is included between these two planes must be bounded by parallel surfaces. True, the surface of the knife does not remain at the same angle to the plane of the glass, but as it is not the surface but the edge of the knife that determines the cutting, the difference in the angle between any two positions of the knife for a section of ten microns in thickness, which amounts to one-hundredth of a degree, should not make any difference in the cutting of a section. For specimens larger than one-half inch, the position of the knife can be altered by a joint in the long bar (*n*).

For cutting paraffin, the knife must be placed at right-angles to the line of motion. For this purpose, a smaller knife, fitting into the same place as the larger one, is used, but with its edge standing in the other direction. As the two screws which are parallel to the edge of the knife must remain fixed, the micrometer screw and one of the other screws must be made to change places. Owing to the principle upon which the instrument is constructed—*i. e.*, that the measurement is made at the end of the long bar, the knife being situated at the upper end,—any possible error in the construction of the instrument will be divided by five at the knife. Mechanically, it is just as easy—indeed more easy—to construct a screw having ten threads to the inch as one having fifty threads to the inch.

The measurements are made as follows: The long arm of the sliding piece measures 12.5 inches; the knife is situated at a distance from the short bar equal to one-fifth of the entire length of the long bar; the screws have ten turns to the inch, so that a complete revolution of the micrometer screw lowers the long end of the sliding piece one-tenth of an inch. Inasmuch as the knife is situated at one-fifth of the distance from the point of rotation, the knife must be lowered one-fifth as much as the end of the long arm—in other words, for every complete rotation of the micrometer screw the knife must be lowered one-fiftieth of an inch. But

there are one hundred divisions on the head of the microm- eter screw; hence for every one of these divisions the knife is lowered $\frac{1}{5000}$th of an inch, or five microns.

Dr. Yankauer said that the theoretical advantages of the instrument were : (1) That inasmuch as the specimen remains absolutely fixed, the entire motion being limited to three points and one screw, the possible errors were diminished ; and (2) that the errors in the knife were one-fifth as great as any possible errors in the micrometer screw. It was import- ant in this instrument, however, that the plane of the glass should coincide exactly with the bottom of the hole, and that the edge of the knife should be parallel to the plane of the screw-points. The accuracy of the former could be easily determined by placing a ruler on the glass plate, and noticing where the ruler strikes the small projections at the apex of the stand.

To determine whether or not the edge of the knife was parallel to the plane of the screw-points, the ruler should be placed across the two screw-points. On holding the ruler against the light, one obtained a reflex across the knife, and when the light was almost entirely cut off, any lack of paral- lelism would be shown by an irregularity in the thickness of the band of light. If not parallel, the parts could be very easily readjusted. For the reasons already given, the manu- facturer was enabled to make the instrument very much more cheaply than other microtomes. The instrument will be sold by Tiemann & Co., of New York, at a very low price. It would cut in celloidin sections having a thickness of fifteen microns, and in paraffin sections having a thickness of three microns.

Dr. F. S. MANDLEBAUM said that he had used this micro- tome before it had been perfected, and had succeeded even then in making very good sections with it. With any new microtome, one felt rather awkward at first. So far as he knew, the principles of its construction were entirely novel. The instrument was not quite as compact as some others. It had one drawback, *i. e.*, when one desires to use paraffin,

serial sections are usually wanted, and these could not be cut with this instrument.

The PRESIDENT said that as he had watched the action of the instrument it had seemed to him that it was not sufficiently rigid, and that it would be apt on this account to ride over the specimen at times. But even as at present constructed it apparently did very good work.

Dr. YANKAUER said that this defect had been noticed in the original model, which had been made of wood. It was his intention in future instruments to have the bars made heavier.

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Stated Meeting, February 24, 1897.

JOHN SLADE ELY, M.D., PRESIDENT.

Dr. JAMES EWING presented a specimen of

TOTAL THROMBOSIS OF THE LEFT PULMONARY ARTERY.

The specimen had been taken from a woman thirty-eight years of age, a laundress by occupation. The previous history was negative. There was no history of rheumatism. She had not been very ill until about six months before her death, which had occurred on February 18, 1897. On admission to the hospital, there were the physical signs of advanced mitral stenosis. During the two or three months she was in the hospital, the course of the disease was that of a severe mitral stenosis. The principal symptoms were referable to the pulse, which was irregular, small, and at times very intermittent. At one time there was a very severe attack of tachycardia in which the pulse ran up to 180. There was one attack of severe hematemesis. The pain in the precordium was severe throughout the illness, but there was no history of an acute exacerbation of this symptom. There was considerable œdema at the time of admission, and this increased steadily up to the time of her death. The urine contained albumen and

numerous casts. The manner of death was of interest. She
became delirious about five days before death, but at no
time showed any severe acute exacerbation of the symptoms,
such as would indicate the occurrence of the thrombus, or
an occlusion by an embolus. She was comatose for two
days before death. There was practically no fever during
her stay in the hospital. During the last two weeks the
temperature did not rise above 99°, and there were no
evidences of pneumonia. At the autopsy, it was noted that
there were moderate anasarca and jaundice, and on opening
the thoracic cavity the right lung was found to be consoli-
dated. There was about one litre of slightly blood-stained
serum in the left pleural cavity. The left lung appeared to
be rather diminished in size. It was apparently the seat of
the ordinary consolidation that occurs in advanced heart
disease, but on section the lung was found to represent
a complete infarct, the whole tissue being studded with
rather large infarcts. The pleural surface of the lower lobe
had become adherent, and when torn apart showed a large
cavity in the lower lobe, which had evidently arisen from
softening of an infarct. In the upper lobes were two areas of
softening. Around all the infarcts were areas of lighter
color, representing the zones of hyperæmia. The other
lung showed two infarcts. The heart was of moderate size,
and presented a uniformly narrowed mitral valve, admitting
the tip of the little finger. All the chambers of the
heart were dilated. There was hypertrophy of the left
auricle only. The left auriculo-appendix contained an old
and partly organized thrombus. There was some freshly
clotted blood in the right side of the heart, but there
were no old parietal thrombi or points of origin here for
a thrombus. The liver showed advanced chronic conges-
tion, and the kidneys chronic congestion with nephritis. The
spleen was much enlarged and congested. It was evident
from an examination of the specimen that the lung had
been converted into a single large infarct. The large cavity
in the lower lobe was surrounded by fibrin where it had been

adherent to the parietal pleura, and evidently antedated the one in the upper lobe. It was interesting that no date could be fixed for the beginning of this extensive lesion, and that, notwithstanding its existence, the patient was able to breathe fairly well. This history was in marked contrast to that given by the cases in which sudden death occurs after confinement, due to the occlusion of one branch of the pulmonary artery by a thrombus.

From a pathological standpoint, the etiology was also of interest. It might be supposed that the lung had first been the seat of a pneumonia, and afterwards of a thrombosis which finally reached the pulmonary artery. On section, however, aside from the lesions of chronic congestion, there was no inflammatory exudate found, except in the zones around the infarctions; hence, such an origin could be excluded. Another possible origin was an endarteritis of the pulmonary vessels, leading to a parietal thrombus, beginning perhaps in the lower lobe, and causing the gangrenous cavity; but on section none of the lesions of endarteritis was found. A third possible mode of origin was the ordinary marantic thrombus, but one would naturally look for some other exciting cause, as, for instance, a small area of inspiration pneumonia, leading to thrombosis of a vessel which, owing to the failing circulation, had increased until the entire pulmonary artery had been occluded. None of these explanations seemed to the speaker entirely satisfactory. It was worthy of note that the thrombosis could not have arisen from the heart, as there was nothing in the right side of the heart to give color to such a view.

HÆMATO-MYELOPORE—A NEW SPINAL-CORD DISEASE.

Dr. IRA VAN GIESON said that since 1886 he had been engaged in a study of the origin, nature, and distribution of certain slender columns or canals in the spinal cord, which had been hitherto unexplained. He believed they were expressive of a disease of the spinal cord of distinctive individuality, deserving of a name, and he had therefore

given to it the name, "hæmato-myelopore." The word is from the Greek, and signifies an aqueduct or canal in the spinal cord arising from a hemorrhage.

The speaker said that he had first met with this lesion of the spinal cord in 1886 at the St. Catharine's Hospital in Brooklyn. The patient was a middle-aged man who, in falling from an ice-wagon, had injured his back. He developed a severe paraplegia, but lived for nine months. The autopsy showed an old fracture of the spinal cord at about the twelfth dorsal segment. The spinal cord at this point was reduced to a small band. Extending upward through the whole dorsal region was a narrow, slender, partly tubular canal, which contained necrotic elements of the cord substance. Dr. Van Gieson here exhibited drawings of the lesion found in this case. He said that at the time the condition had been mistaken for syringo-myelia. The specimens were taken to the pathological laboratory at Heidelberg, where the opinion was also expressed that the case was one of syringomyelia. Some time afterward, Dr. Dana had secured an autopsy on a woman who had been suddenly seized with an acute trans-verse myelitis, occurring without traumatism. This case also showed a long, narrow, tubular canal in the spinal cord. The focus of the myelitis was found in the mid-dorsal region. Dr. Dana published the case in 1889 under the title: "A Case of Acute Myelitis with Central Perforating Necrosis of the Spinal Cord." In 1891, the speaker published the case first referred to, under the title; "Traumatic Myelitis; Destruction of the Twelfth Dorsal Segment, with a Column of Necrosis Extending into the Dorsal Region." More recently he had met with three or four cases of traumatic hæmato-myelia. The mechanics of the spinal cord showed why it was necessary for blood escaping into the cord to assume the form of slender columns. The distribution and topography of these hemorrhages so closely simulated that of the canals already referred to, that he was led to look upon these hemorrhages as the true ex-

planation of the "perforating necrosis." Blood passes through the gray matter and disintegrates it. After a time, this may be absorbed, leaving a clean-cut hole in the spinal cord. Up to the last few months, he had been unable to find the intermediate stage between the columns of hemorrhage and the perforating necrosis, but through the courtesy of Dr. Fraenkel he had been able to study a case in which this intermediate stage was present. There is a disposition after a time to the formation of new neuroglia tissues about these long, slender canals, and it is for this reason that the condition had been taken for syringomyelia. The symptoms of hæmato-myelopore are entirely distinct from those of syringomyelia, although resembling them in some particulars. The structural resemblance between the two diseases is due to the inflammation which tries to replace the tubular gap in the spinal cord in hæmato-myelopore. Dr. Van Gieson said that he had artificially injected the spinal cord with colored gelatin, and had found that these injections took the form of the columns observed as a result of hemorrhage.

Dr. EWING said that the Society should be congratulated on being the first to hear the presentation of this important subject. The speaker had stated that the course of the blood was determined by the limitation afforded by the pia mater. It would seem to him that the blood should be able to travel in any direction, within the limits of the pia mater; hence he could not understand this slender columnar distribution. The charts exhibited would seem to indicate that near the source of the hemorrhage several such columns were sometimes present.

Dr. VAN GIESON replied that if the spinal cord were injected with colored fluids, it would be found that more resistance was met in passing transversely than in passing vertically through the cord. The two crescents of gray matter are softer and more spongy than the nerve fibres, and hence offered less resistance. There are interstices between the nerve fibres which constitute slender canals—

indeed, the whole spinal cord would appear to be constructed as if it were itself a columnar or tubular formation. Dr. Van Gieson then announced the publication of a more detailed presentation of the subject in the *State Hospital Bulletin*, and a final presentation of the disease to the Congress at Moscow during the coming summer.

Stated Meeting, March 10, 1897.

JOHN SLADE ELY, M.D., PRESIDENT.

THE RESULTS OF EXPERIMENTAL NEPHRECTOMY IN DOGS, AS BEARING UPON THE URÆMIC STATE.

Dr. C. A. HERTER presented a report on the results of his study of this subject, chiefly with a view to indicating that the blood, after ligation of the vessels, or removal of the kidney, underwent a change in its toxicity. The paper was based on fourteen observations, all of which were upon the dog, with one exception. In that case the pig was the animal experimented upon. In one animal, death followed the removal of one kidney, and this was explained by the fact that after death the other kidney was found to be the seat of an extensive hydronephrosis. Both kidneys were extirpated in six dogs and in a pig. The average duration of life was two and a half days, the shortest being twenty-four hours, and the longest, four and a half days. Immediately after the operation, there is usually considerable prostration ; in the case of the pig there was, however, marked restlessness. The first striking symptom is vomiting, which begins about the end of the first twenty-four hours. It is usually repeated a number of times, and then ceases. The vomited matter is ordinarily bile-stained, and sometimes contains blood. In four of the dogs, diarrhœa was associated with the vomiting, more or less blood being commonly present in the diarrhœal discharges. Food was

refused by all the animals except the pig. At the time
of the vomiting there was usually much prostration, and
the respirations became much slower and deeper, the respi-
rations being reduced from 50 to 80 per minute to 25 per
minute at the end of forty-eight hours. In some instances,
the rate fell as low as 14 to the minute. At first, the heart
action was normal, but it usually became slower after a while,
the reduction being from 150 to 80 per minute. This was
associated with a distinct increase in the force of the heart's
action, and usually in the fulness and tension of the pulse.
After forty-eight hours the nephrectomized animal was
apt to become drowsy and remain in this state until death.
In some of the dogs, living more than fifty hours, there was
fibrillary twitching of the muscles. In only one case was
there a true convulsive seizure. This occurred in a dog
living eighty-two hours after the removal of both kidneys.
It was preceded by pronounced fibrillary contractions, and
consisted of clonic spasms of several minutes' duration. It
terminated fatally. Such seizures, the speaker said, ap-
peared to be quite rare in cases of experimental uræmia.
He had not been able to satisfy himself that blindness ever
occurred in these dogs. During the last hours of life the
respirations were even slower than during the middle period,
but they were more shallow. In some instances, there was
pronounced irregularity of breathing, sometimes suggestive
of Cheyne-Stokes respiration. These symptoms justified
the belief that they were dependent upon paralysis of the
respiratory mechanism. Death, however, invariably oc-
curred from respiratory failure. On the other hand, the
heart, even in the terminal stage, continued to act forcibly,
and maintained a nearly normal arterial pressure to the end.
On division of the vagus nerves at this time, the pulse-rate
was increased. The cardiac symptoms were evidently the
result, in part at least, of vagus inhibition. In several
nephrectomized dogs there was a striking increase in the
fulness and tension of the femoral pulse, in comparison with
that found before operation. No doubt such a pulse in

a nephritic patient would be called a high-tension pulse.   At times, the heart sounds were much increased in intensity on the second or third day after nephrectomy, and the aortic second sound was especially loud and valvular.   In these animals the temperature was never increased above the normal, except as a result of sepsis ; on the contrary, the temperature was 1 to 3 degrees Fahrenheit below the normal for the greater part of the period of observation.   The symptoms were practically the same in all the animals, whether the kidneys were removed or the ureters were simply tied—a matter of much importance as it showed that Brown-Sequard's theory of uræmia was hardly sustained.

A most important feature of these cases was that the blood serum was found to be increased in toxicity if taken twenty-four hours or more after operation.   The degree was roughly related to the duration of the experiment. This toxicity was either much reduced, or quite lost, by exposing the serum for a few minutes to a temperature between 60 and 67° C.   The change in toxicity was associated with a darkening of the serum, and the development of a peculiar odor.   Dr. Herter said that he had not yet been able to determine the point at which this change in toxicity first took place.   It was sometimes noticeable that this loss of toxicity was not so complete with an exposure for two minutes to a temperature of 67° C. as with an exposure of five minutes.   At times, there was a slight separation of a reddish gelatinous material at this temperature, but without distinct coagulation.   It was possible that the substance whose activity was destroyed is a globulin, but all attempts to determine its nature had hitherto failed.   It was important to note that the *normal* serum of the dog is toxic to rabbits.   Former observers, the speaker said, had not noted that in the case of dogs the normal serum underwent a striking reduction in its toxicity by heating the serum in the manner just described in connection with the foregoing experiments.   The increase in the toxicity of the serum va-

ried ; sometimes it was not more than one-third more toxic than the normal serum, but in other cases it was from two to six times more toxic than the normal.

It was important to emphasize the fact that the results obtained by this experimental study were of the most definite character, and that the results had been concordant in all the cases in which the serum of nephrectomized animals had been tested. In these experimental studies the rate of making the injection is of importance. For instance, if made too rapidly, more serum would be injected than was required to cause the symptoms or produce death. He had found that the rate should be from 2 to 5 cc. per minute. It was important to distinguish between the results obtained in studying the toxicity of urine and those resulting from a study of the toxicity of the blood serum. In the case of the urine, the potassium salts form an exceedingly important element, as from 60 to 80 per cent. of the toxicity of the urine is due to the presence of these salts—in other words, only a comparatively small proportion is due to the organic ingredients, such as urea, extractives, etc. Unless, therefore, we knew just how much potassium salts was present, particularly the chloride, we could not say just how much of the toxicity was due to the salts. In the blood serum there would be found very little potassium salts. The diminution in toxicity in these experiments could not be ascribed to the destruction of the extractives and urea, because a far higher temperature is necessary for their destruction. The diminution of toxicity appeared to be due to a substance similar in its properties to that found in the urine of some cases of human uræmia. In both cases, the toxicity was destroyed or reduced by the application of heat, and the color and odor underwent similar, if not identical changes.

The muscles and the liver were extracted with a two per cent. salt solution at the room temperature, and the clear extracts were injected into rabbits. It was found in this way that the liver did not store the thermo-sensitive substance, and that it did not give positive toxic results. We must

look to the skeletal muscles for information regarding the
thermo-sensitive substance which is responsible for the
change in the toxicity of the blood. Occasionally, massage
had been found harmful in patients with chronic nephritis on
the verge of uræmia, resulting sometimes in aggravating
the dyspnœa and general discomfort. An extract of the
muscles of the normal dog when injected into rabbits was
found also to be toxic, but in a rather different way, the
animals dying apparently of suffocation and without the de-
velopment of convulsions. The significance of this observa-
tion was not yet known. As was well known, the urea of the
blood in these nephrectomized dogs is increased from two to
ten times the normal amount, varying with the time the
animal lives after the nephrectomy. In the nephrectomized
dogs, changes in the color of the retina had been observed.
Marked congestion of the intestine was quite frequently
found in these animals. A marked congestion of the
mucous membrane of the small intestine, of uneven distribu-
tion, was commonly found after forty-eight hours. The
mucous membrane of the stomach was often moderately
congested, as was also that of the lower colon and rectum.
A similar congestion might be produced by large intravenous
injections of urea, but the congestion was apparently not
due to urea in the experiments under consideration, as com-
paratively small quantities of urea were found in the intestine.
A similar congestion was produced by injecting into dogs
the serum from uræmic patients.

Dr. Herter said that he had analyzed 41 apparently reli-
able cases in which anuria in the human subject had lasted
more than four days. On the 21 autopsies in these cases,
the ureter or pelvis was obstructed by calculus in 14, and in
3 growths obstructed the ureters. Of 36 cases in which
there was absolute or nearly total anuria, in 11 the anuria
lasted more than four days, and in 7 more than fourteen
days. In 7 of the 41 cases, no uræmic symptoms occurred,
although the duration of the anuria was from five to eleven
days, and caused death in at least 3 of the cases. In a

number of the cases more than a week elapsed before the indications of uræmia began ; in most cases it was from the seventh to the ninth day. In 12 of the 40 cases, vomiting was present at some period. Diarrhœa was noted in only 6 cases. Insomnia and restlessness were observed early in a number of the cases. Pronounced delirium and general convulsions were rare. Muscular twitchings were observed in about one-fourth of the cases. The mental faculties were often but little impaired. Death was usually preceded by drowsiness, if death were deferred more than a week. Motor paralysis was not noted in 1 of the 41 cases. In 4 cases there was a urinous odor to the breath. Contraction of the pupils was a common and characteristic symptom. The temperature was elevated in only one of these cases. In the last days of life the temperature was apt to be subnormal. On comparing the symptoms of human obstructive and experimental obstructive uræmia, it would be found that vomiting was an early symptom ; that marked muscular prostration was usually present in both ; that delirium and paralysis were absent in both ; and that in the terminal stages fibrillary twitchings were common in both, and general convulsions were exceptional. The most important clinical resemblance was that the temperature was normal or slightly sub-normal. A patient with both ureters blocked might live two weeks, yet a dog with both ureters tied did not live more than one week. This difference could hardly be ascribed to the shock of the operation. The pupils were much more apt to be contracted in man than in dogs. When the urea accumulates in the blood of a dog beyond a certain point (.5 per cent.), it is excreted by the intestine. It would seem probable that the pathological conditions in nephrectomized dogs were essentially those which are responsible for the symptoms of obstructive uræmia in human beings. Unfortunately we have no definite knowledge of the condition of the blood in cases of obstructive uræmia in the human subject. It should be remembered that uræmia is not a specific intoxication, but is due to the accumulation

of several classes of toxic substances in the blood when the kidneys are unable to do their work properly.

Dr. JAMES EWING asked if in the liver of the dog any condition resembling that found in cases of eclampsia had been observed—in other words, was there any indication of a hemorrhagic hepatitis?

Dr. HERTER replied that he had observed this condition of the liver in some cases of puerperal eclampsia, and a somewhat similar condition in some of these dogs, but he did not feel sure that the two conditions were identical.

Dr. IRA VAN GIESON expressed his high appreciation of work of the class represented by this paper. He said that he had induced uræmia in some animals by injecting the serum from uræmic patients, but his observations had been too few to be of much value at the present time. He predicted that bleeding would come into favor again as a therapeutic measure, simply because of its removing toxic substances from the blood. The examination of the cells of the cerebellum in three uræmic cases that he had studied, showed, in slight degree, the mark of toxic degeneration— a resolution of the cytoplasmic elements of the cell. Four rabbits were injected with the serum of uræmic cases, in small amounts and cumulatively. He preferred to introduce a time element than to give the serum continuously up to a fatal result; he preferred to have from six to forty-eight hours elapse before death, as this offered a better standard of comparison. The animals showed an œdema of the upper extremities, and died with œdema of the lungs. The pleural cavities contained over an ounce of transuded material — a condition that he had never seen in any other experiments on rabbits. The temperature dropped from 103° to 99°, and remained so for some time after the injection. An increase of temperature in a rabbit was very easily produced, but a decrease in the temperature was a matter of much greater significance.

Dr. HERTER, in closing, said that he was inclined to agree with the last speaker regarding the time element in

these experiments. It probably enabled one to detect with accuracy smaller differences of toxicity, but the differences had been sufficiently striking by the method that he had employed to lead him to continue it in order that he might make fair comparisons with the earlier cases. He was very strongly disposed to accept the statement that bleeding would become in the future a much more frequent thera-peutic measure, yet it should be remembered that these conditions are often very complex. The most favorable conditions for bleeding were : a good heart action and a high-tension pulse, moderate anæmia only, and intense dyspnœa. The relief to the dyspnœa was most striking, even where the administration of arterial dilators gave little, or only very temporary relief.

AORTIC VALVE WITH ONLY TWO SEGMENTS ; ADULT HEART ; CONGENITAL ORIGIN.

Dr. E. P. SHELBY, Jr., presented a specimen that had been removed from a man, forty years of age, admitted to Bellevue Hospital on December 12, 1896. He gave a his-tory of having suffered since infancy from shortness of breath and nervousness. He did not remember having had rheumatism or chorea, or any of the infectious diseases of childhood. The only serious illness that he had ever had was an attack of pneumonia, which had occurred in his twenty-fifth year. He had been a steady drinker of whiskey, and had used tobacco to excess. He had never had any venereal disease. Two weeks before coming to hospital he had caught cold, and had become feverish, and felt a soreness in the chest, and had begun to cough. After a few days, he had noticed small, dark clots of blood in his sputum. Then he had become very short of breath, and his feet had begun to swell. On admission, he was slightly cyanosed, and was suffering greatly from dyspnœa. The respirations were rapid and shallow. On account of the loud, rapid breathing, physical examination was unsatisfactory, but an

obstructive murmur at the mitral valve was discovered, and moist râles were heard over both lungs. On the eighth day after admission, he became delirious, but remained in this state only a few hours. At this time there was more marked cyanosis. The respirations were regular, but rapid and shallow. The apical impulse was in the sixth interspace in the nipple line, and was irregular in force and rhythm. A well-marked purring thrill was felt. The area of cardiac dulness was continuous with dulness over the lower lobe of the left lung. There was a pre-systolic murmur, with a maximum intensity at the apex. The sounds at the other valves were normal. The respiratory murmur was absent over the lower part of the left lung, and there was distinct tubular breathing. Pleuritic friction sounds were heard over the right lung, and here and there were a few fine, moist râles. The patient died in a few hours from the time of this examination.

The autopsy was made forty-eight hours after death. The body was well developed, and of medium size, but poorly nourished. The brain was normal. The left pleural cavity was obliterated by firm, old adhesions. There was a slight excess of fluid in the right pleural cavity, but no adhesions. The pericardium was tense, and was slightly displaced downward and to the left by the adherent lung. There was a normal amount of serous fluid in the pericardium. There was a thrombus in the left pulmonary artery, just below the point at which the first large branch is given off. About half of the lower lobe of this lung was consolidated, and on section presented the appearance of an infarction. There were congestion and œdema in the upper lobe. The right lung showed two small circumscribed areas of fibrinous pleurisy, which corresponded to two small infarctions. In the other parts of this lung there were marked congestion and œdema. The liver weighed three pounds six ounces; was firm, dark red in color, and on section showed the nutmeg appearance of passive hyperæmia. The spleen weighed six ounces; was soft, and in its anterior border

presented a deep, congenital fissure in which was attached a part of the omentum. The kidneys weighed seven ounces each. The capsule was not adherent, and left a smooth surface on removal. The markings were distinct, the cortex slightly swollen, and the pyramids congested. The stomach and intestines were congested. All the cavities of the heart were distended with dark, partially clotted blood, but no firm clots were found. There was great dilatation of the left auricle, and slight dilatation of all the other cavities. The walls were pale and rather soft. The tricuspid and pulmonary valves were normal. The mitral valve would only admit the end of one finger; its cusps were greatly thickened, and there were adhesions in the angles between the cusps. In one angle there was a calcareous deposit. The aortic valve had only two segments, an anterior and a posterior, both of which were very thick. The segments were of nearly equal size, the anterior being slightly longer. About the middle of the base of the anterior segment was a small constriction, which caused a slight puckering, but which did not involve the free border. At a point in the aorta which corresponded to the centre of this segment there was a distinct ridge, which seemed to mark the place where a third segment should have been attached. There was a calcareous plaque near the left end of the posterior segment, which did not extend to the free border or the aortic attachment. The sinuses of Valsalva were pouched out. Both coronary arteries were given off from the anterior sinus. There were a few atheromatous patches in the aorta at the upper margin of the sinuses. The valve was quite competent. When freed from blood, the heart weighed fourteen ounces.

The history and the appearance of the specimen, Dr. Shelby said, seemed to warrant the conclusion that this was a congenital affection, probably due to disease during intrauterine life; and that the absence of one of the segments was caused by the coalescence of two segments at the time of their formation. The specimen illustrated the fact that a

valve of this type might be entirely competent and yet have
only two segments.   It seemed clear that the lesion at the
mitral orifices caused all the symptoms.   The nearly equal
size of the segments showed the wonderful adaptability of
these segments to each other.   After two small segments
had united to form this large anterior segment, the pos-
terior segment appeared to have undergone extra develop-
ment to meet the requirements of its fellow.   The unusual
thickness of both aortic and mitral valves, and the cal-
careous deposits in them would indicate that there had been
during extra-uterine life a chronic endocarditis, but he
thought there could be no doubt that the primary lesion
had started *in utero.*

ADENO-CARCINOMA OF THE KIDNEY ; TOTAL THROMBOSIS OF THE VENA CAVA.

Dr. JAMES EWING presented a kidney which had been
removed from a German, forty-eight years of age.   The
patient gave a phthisical family history, and a personal
history of excessive indulgence in alcohol and of syphilitic
infection in his youth.   Ten months before his death he
had noticed a swelling of the legs and feet, associated
with headache and vomiting.   Urination was then normal.
These symptoms disappeared after a short time, but re-
turned four months later, and then the urine was at times
scanty and bloody, and he had severe pain in the kidney
and on urinating.   After three weeks these subsided.   Six
weeks before admission to the hospital they reappeared
and, in addition, the abdomen began to swell.   The stools
were light-colored ; the superficial abdominal veins were
considerably distended.   There was no abdominal pain and
very slight ascites.   The urine was alkaline, had a specific
gravity of 1024, and contained five per cent. of albumen
and a few blood cells, but no sugar.   Physical examination
showed slight quantity of fluid in the chest, with œdema
of the lungs ; the heart was normal ; the spleen was not
palpable.   While in hospital there were no urinary symp-

toms, but he developed symptoms of obstruction to the portal circulation and to the venous return from the lower limbs.   The distension of the abdominal wall was the chief feature clinically.   It was thought that there was probably a thrombosis of the portal or mesenteric vein.   He was tapped, but this was followed by peritonitis and death in forty-eight hours.   At the autopsy, the chamber of the right auricle showed at the opening of the inferior vena cava a round, whitish mass, looking like a blood-clot.   There was no endocarditis.   There was also a partially necrotic mass in the region of the vena cava, behind the liver.   The vena cava was distended to the diameter of nearly three inches at this point, and was entirely occluded by a large mass of tumor tissue, which proved to have been derived from the original tumor in the kidney.   The right kidney showed the appearances of carcinomatous or adenomatous growth arising in the cortex, projecting into the pelvis and infiltrating the tissue around the renal vessels, and passing up the renal veins to the vena cava, where it had grown rapidly.   A completely organized thrombus was found in the vena cava below the kidney, reaching into the iliac veins and extending below Poupart's ligament.   Another interesting feature was the apparent reconstruction of the circulation through the intestines, spleen, and left kidney, as these organs showed very little venous congestion.   The hepatic vein and its smaller branches were occluded by freshly clotted blood.   The liver, of course, was extremely congested, but the other abdominal organs only very moderately.   Another point of interest was the fact that the patient had survived a total thrombosis of the vena cava, this thrombosis having apparently existed for five weeks.

HÆMATO-MYELOPORE.

Dr. IRA VAN GIESON presented a specimen from one of the cases of hæmato-myelopore described by him at the last meeting, and demonstrated the columnar lesion found in the spinal cord.

Stated Meeting, March 24, 1897.

WARREN COLEMAN, M.D., VICE-PRESIDENT, in the Chair.

Dr. E. P. SHELBY, Jr., presented a specimen of

RUPTURE OF THE HEART.

The lesion occurred in a woman, sixty-six years of age, who had been treated for heart disease ten years before. She was confined in an insane asylum for some time, but was discharged as harmless, three years ago. During the past few months she had lived in constant fear of being poisoned, and had refused every article of diet except eggs. Three days before death she began to suffer from diarrhœa and nausea. These symptoms grew worse until the third day, when she died suddenly after a violent paroxysm of vomiting. An autopsy was held forty-eight hours after death by Dr. E. J. Donlin, who had kindly sent him the specimen and the history of the case. The body was greatly emaciated. The brain was anæmic, but showed no other gross change. The left pleural cavity was filled with clotted blood. The right pleural cavity was normal. Both lungs were anæmic. There was a distinct tear in the left side of the pericardium, and the sac contained several ounces of blood. The heart was covered with blood, and on its posterior surface presented a rupture in the wall of the left ventricle, about half an inch long, running parallel to, and half an inch from, the ventricular septum, about midway between the apex and base. Around the point of rupture there was an extravasation of blood under the pericardium. On the inner surface of the ventricle was an L-shaped tear, whose long side ran from above downward and measured 1.5 inches. The short side extended three-fourths of an inch to the left. The heart wall at the point of rupture was rather thin, and somewhat paler and softer than normal, but there was no indication of ulceration. Minute examination revealed a thrombus in the right

coronary artery, which had started in a calcareous area about one inch from the aortic orifice. There were also two calcareous patches in the left coronary artery, which greatly diminished its lumen. As the thrombosed vessel was the one which nourished that part of the wall in which the rupture occurred, it was probably the predisposing cause. The heart weighed thirteen ounces. There was no valvular change except a slight thickening of the mitral valve. The stomach contained a small quantity of yellowish mucus, and several pieces of hard-boiled egg. The mucous membrane was congested. The small intestine showed marked congestion in places. The kidneys, liver, and spleen were anæmic, but no pathological changes were noted. The violent effort at vomiting, which was probably due to the irritation of the hard-boiled eggs, seemed to have caused the rupture in the heart wall; and the fact that the pericardial sac was also ruptured would indicate that the heart had continued to contract after the initial rupture had occurred.

Dr. WARREN COLEMAN said that it was the first case of rupture of the heart that had ever come within his observation, and it was exceedingly interesting from the fact that from the gross examination there was no evidence of any change in the heart at the location of the rupture. But in these cases of rupture of the heart there was almost always some lesion which appeared to have impaired the integrity of the wall.

PERTUSSIS—PUNCTATE HEMORRHAGES IN THE BRAIN.

Dr. ROWLAND G. FREEMAN presented a brain which was the seat of punctate hemorrhages following whooping cough. The specimen had been removed from a colored child, two years and a half old, who had been admitted to the Foundling Hospital in a moribund condition. It had, at the time, a temperature of 101.5° F., and a pulse of 180. There were general convulsions with attacks of coughing, and these

attacks were followed by some strabismus. The child died twenty-four hours after admission, and the autopsy was made forty-eight hours after death. There was no rigor mortis. There was one ounce of serum in the right pleural cavity, and a small amount of fibrous exudate. The right lower and middle lobes of the lung and the posterior fourth of the upper lobe showed marked lobular pneumonia. In the left pleural cavity were four ounces of serum. The pericardium contained one ounce of serum. The right auricle was distended with a firm clot, which passed into the right ventricle and up into the pulmonary artery. The liver was considerably enlarged. The spleen was enlarged below the free border of the ribs. The stomach was distended with gas. The brain showed punctate hemorrhages throughout the cerebrum, but none in the cerebellum or in the pons. These hemorrhages were confined to the white matter.

The speaker said that in cases of pertussis, hemorrhages were common in many places, but were noticed most often, perhaps, in the conjunctiva. Epistaxis, hemoptysis, hemorrhage from the ears, and purpuric eruptions were also not infrequent. Trousseau had reported a case in which a child was said to have cried " tears of blood." The occurrence of cerebral hemorrhage in connection with pertussis had been reported by Marshall in 1885.

Dr. FREEMAN also presented specimens from two cases of

LARGE WAXY LIVER IN CHILDREN.

The first was that of a child of six years, who died at the Foundling Hospital on March 21st. It had been under observation in the hospital for a number of years. In July, 1896, it was noted that the child had an upper lumbar and a lower dorsal kyphosis, with a sinus draining below the right hip. In September the child had gastro-enteritis, with a temperature of 103° F. In October an abscess developed in the lumbar region, and the old sinus reopened. In

November the liver was first noticed to be enlarged. There was no cough, nor were there any signs in the chest. Examination on March 1, 1897, showed the liver to be very large and firm, and the spleen also increased in size. The urine contained 25 per cent. of albumen. On March 10th there was fluid in the abdomen; the extremities were swollen; there were signs of fluid in both sides of the chest; and the liver extended to the umbilicus. On March 21st the child died. The autopsy was made twelve hours after death. There was no rigor mortis. The body was very markedly emaciated. The peritoneal cavity contained 2500 cc. of clear serum. The lungs and large bronchi contained some mucus. The bronchial lymph nodes were enlarged, and one contained some fibrous tissue looking somewhat like an old phthisical process; there was, however, no active tuberculosis found in these nodes. The diaphragm was at the fourth space on both sides. The liver extended from the fourth space to the level of the umbilicus; it was very hard and waxy. The spleen extended below the free border of the ribs, and was also waxy. The pancreas was large. The adrenals were enlarged, and apparently both were tuberculous. The kidneys were pale and waxy. The mesenteric lymph nodes were enlarged. There was a bone abscess arising from the spine.

Dr. Freeman said that this was the first case of waxy liver that he had ever seen at the Foundling Hospital, an institution in which, for the most part, the children are under two years of age.

The second case of waxy liver occurred in a child of ten years. This child had had a persistent and progressive anæmia for very nearly a year. In September the hæmoglobin was only 27.5 per cent., but there was no leucocytosis. The cause of the trouble was not suspected. At the autopsy the examination of the lungs and heart was negative. The liver extended from the fourth space to the umbilicus, and was hard and waxy. The spleen extended to a line drawn from the umbilicus to the left anterior-superior

spine of the ilium. The left kidney was the seat of a very large abscess, and the capsule was hard and thick. The right kidney was pale and waxy. In this case, the right adrenal, or the one on the opposite side to the kidney lesion, was tuberculous. There were also two tuberculous mesenteric lymph nodes. No other tuberculous lesions were found. The speaker remarked that so far as he had been able to ascertain, tuberculosis of the adrenals is very rare in children. There was no pigmentation of the skin or other evidence of Addison's disease.

Dr. COLEMAN said that he had carefully examined the adrenals in all autopsies that he had made during the past five years, yet he had only found them infected in three cases—all adults. From some experiments that he had made on animals he had been led to believe that there was something about the adrenals that tended to protect them in large measure from infection.

Dr. SHELBY asked if tubercle bacilli had been found in the pus from the abscess in the kidney.

Dr. FREEMAN replied that owing to a misunderstanding such an examination had not been made. The appearance was that of a tuberculous abscess, but microscopical examination of the wall did not give evidence of any tuberculous process.

Dr. DAVID BOVAIRD said that the first child had come under his care first for a tuberculous process of the spine, and had been treated with a brace. After a year a psoas abscess developed, and, after a while, this ruptured. The discharge continued for some time, and then the sinus closed. Following that, a lumbar abscess appeared, and steadily increased in size. The enlargement of the liver and spleen was apparently secondary to the lumbar abscess. It was interesting to note that, although the disease in the vertebral canal was apparently in process of healing, the lumbar abscess developed.

Stated Meeting April 14, 1897.

WARREN COLEMAN, M.D., VICE-PRESIDENT, in the Chair.

Dr. JOHN H. LARKIN presented an

ANEURISM OF THE THORACIC AND ABDOMINAL AORTA,

which had been taken from a man forty-five years of age, who had a pronounced syphilitic history.   For a number of years a pulsating tumor had been noticed in the epigastric region, but it had never caused any distress.   He entered the hospital about one year ago, and after remaining there for a month and a half, went out again.   About two months ago he was re-admitted for a severe pain in the back.   It was found that the pulsation was much more marked than on his first entrance to the hospital ; he suffered much from dyspnœa, and the heart was displaced laterally.   The respiratory sounds were very indistinct over the left chest.   One night, while in the hospital, he got up, and walked across the ward, and then fell down dead.   It was found that the aneurism had ruptured posterior to the peritoneum, and had discharged downward towards the kidneys.   The case was interesting on account of the large size of the aneurism and the comparative absence of urgent symptoms.   The seventh and eighth and ninth vertebræ were eroded.

ANEURISM AT APEX OF HEART.

Dr. LARKIN then presented a rather large heart, removed from a woman eighty-six years of age.   She had never complained of any cardiac trouble, and death resulted from apoplexy.   The autopsy showed a small aneurism at the apex of the heart, with complete absence of cardiac muscle at the apex of the left ventricle.   There was a replacement fibrosis at this point.   Some parts were quite calcareous, and there was also slight interstitial myocarditis.   The coronary artery was the seat of atheroma.

ANEURISM OF THE SINUS OF VALSALVA.

Dr. LARKIN presented still another heart.   It had been

taken from a man thirty-five years of age, who died from chronic Bright's disease. There was a history of marked syphilitic disease. At the autopsy, in addition to marked chronic diffuse nephritis, there was a large aneurism of the sinus of Valsalva. The posterior coronary artery was only found with some difficulty, and it was markedly atheromatous. It could be traced up to the aneurism, but the opening into the aneurism could not be detected. The coronary artery contained a little semi-fluid blood.

Dr. Larkin said that Sibbs had made a collection of 860 cases of aneurism. Of this number, 87 were at the sinus of Valsalva ; 480 were of the whole arch ; 140 of the ascending portion ; 120 of the transverse portion ; 112 of the ascending and transverse portions together ; 72 of the descending portion ; 20 of the transverse and descending portions of the arch. There were 71 aneurisms of the thoracic aorta ; 131 of the abdominal aorta with the cœliac axis; and 26 of the lower portion of the abdominal aorta.

Dr. SHELBY asked if, in the case of aneurism of the sinus of Valsalva, examination had been made of the muscular fibre ; and if so, if any fatty degeneration had been found in the region which should have been supplied by the coronary artery.

Dr. LARKIN replied that the heart muscle was not fatty. If the coronary artery really had been occluded, there should have been an important lesion of the heart muscle itself. In this case, there had been no symptoms at all referable to the heart.

Dr. COLEMAN said regarding the question of the occlusion of the coronary artery, that in this connection the researches of Porter, of the Harvard Medical School, were of special interest. His experiments on the heart of the dog showed that the coronary arteries were terminal, and if one portion were occluded, the part supplied by it became infarcted. Even though there was an anastomosis there was no passage of blood from one coronary artery to the other by reason of the difference in pressure. If these experiments

were correct, then we must assume that this coronary was open, otherwise there would have been a degeneration of at least a large part of the heart wall supplied by this artery.

Dr. LARKIN said that a number of French pathologists had gone over this ground experimentally, and had come to practically the same conclusions. He now had in his possession a specimen from a case in which vegetations from the valve had gotten into the coronary artery and completely occluded it. In this heart there was a distinct softening of the heart muscle, and also a globular thrombus.

PERUVIAN HEADS—SAVAGE WAR TROPHIES.

Dr. OSCAR A. HOLDER exhibited one of the Peruvian heads of trophies so highly prized by certain tribes near the head waters of the Amazon. He said that these tribes were almost constantly at warfare with one another, and instead of scalping their victims it was their custom to decapitate them and put the head through some secret process by which the features were wonderfully well preserved, appearing like a diminutive of the original. Fine metallic crystals could be discerned in some portions of the specimen.

Dr. SHELBY said that he had just been speaking with a man who travels extensively in Brazil, and who had brought one of these heads to the Metropolitan Museum within the last few days. This gentleman had told him that the process consisted in skinning the head and packing the integumental covering with the bark of a certain tree. It was then hung up and smoked, after which it was dried in the sun.

THROMBOSIS OF THE PULMONARY ARTERY.

Dr. WARREN COLEMAN presented a specimen of thrombosis of the pulmonary artery, removed from a woman, twenty-seven years of age, who about a month previous to her death had given birth to a child at full term in the Emergency Department of Bellevue Hospital. She was discharged at the usual time, the ninth day. About two

weeks later, she entered the general hospital with a moderate temperature, complaining of slight pain in the infra-axillary region on the right side.   The presence of pus was suspected in the pleural cavity, since the uterus was free from sepsis. The patient was confined to bed.   During the three or four days immediately preceding her death she suffered from slight shortness of breath, and the night nurse reported that after twelve o'clock on the night she died she had been very restless, tossing from one side of the bed to the other.   A little before six o'clock that morning she had sat up in bed to bathe her face, and a few minutes later, while taking a cup of coffee, fell back upon the pillow.   The house physician, Dr. R. E. Brown, was called, and he found the patient cyanotic and gasping for breath.   The pulse was rapid, small, feeble, irregular, intermittent, and, at last, imperceptible.   Stimulants were administered, but without avail, and the patient died in a few minutes.

The autopsy was not made until four days after death, but the body had been kept on ice and was in good condition. The pericardium, endocardium, and valves were normal. The right ventricle was markedly dilated and contained a large amount of dark, imperfectly coagulated blood.   The walls of the heart were soft and light-colored, presenting evidences of parenchymatous changes.   The weight of the heart after the blood had been washed out was thirteen ounces.   Part of this hypertrophy, at least, might be accounted for by the recent pregnancy.   Both pleural cavities contained a moderate amount of liquid, though there was no pleurisy.   The cut surfaces of the lungs were congested and œdematous. The lower first divisions of the pulmonary artery to both lower lobes contained thrombi which were intimately adherent to the walls of the vessels.   This union did not extend entirely around the lumina of the vessels, and elsewhere the clots were simply in contact with the endothelium.   When the thrombi were forcibly torn from their attachments, a rough, ragged surface was left, leading to the opinion that the arterial walls had suffered actual change at these points.

This opinion was subsequently confirmed by microscopic examination. From the sections presented, it was evident that the thrombi were at first parietal and partial, and that the vessels were subsequently occluded by further coagulation within their lumina. The arterial wall and clot merged into each other at the point of adherence, so that it was difficult to determine their respective limits. From the presence of cell elements, some of them fusiform, in the outer margin of the clot, it was believed that organization of this first-formed portion of the thrombus had begun. Evidences of infarctions were carefully sought for in both lungs, but without success. The pulmonary arteries, beyond the thrombi, were dissected as far as could be done with small scissors, without finding an embolus. The uterus was subinvoluted. The walls were thickened and the cavity was enlarged. The length of the uterus was 16 ctm.; the breadth at fundus was 10 ctm.; the depth of the cavity from the internal os to the fundus was 8 ctm. The cavity of the uterus contained a small amount of dark brownish material which did not appear or smell septic. The spleen was enlarged and dark. The kidneys were swollen, pale, and moderately congested. Sections showed moderate acute parenchymatous changes. Smear preparations of the clot contained numerous large bacilli, a few small bacilli, and a very few organisms apparently encapsulated and resembling the diplococcus lanceolatus. Cultures from the clot (unavoidably delayed for twenty-four hours) gave nothing but a large, rapidly spreading, foul-smelling, putrefactive bacillus. The incompleteness of the bacteriological examination was, of course, to be regretted.

Dr. Coleman said that the chief interest in this case centred around the etiology of the thrombosis. The occurrence of pulmonary thrombosis had been explained, he said, upon two theories—primary coagulation through changes in the constituents of the blood (Barker and Playfair), or as the result of embolism from the heart, or a peripheral thrombus. There was no thrombosis of the iliac, femoral, or ovarian

veins from which an embolus might have been dislodged, and the right heart contained only imperfectly coagulated blood, so that the dislodgment of an embolus large enough to have been arrested at the site of the thrombosis might be excluded. The theory of primary coagulation from changes in the constituents of the blood was scarcely tenable in the light of existing knowledge as to the causes of thrombosis. The changes which had been noted as present in the wall of the pulmonary artery, rendered it probable that some injury was inflicted to the endothelial lining, and that upon this site coagulation began. How this injury was inflicted would be merely a matter of speculation ; he would suggest, however, that it was in some manner connected with a septic condition of the woman. In phlegmasia alba dolens, coagulation sometimes takes place from causes within the vessel without a pre-existing phlebitis, and the inflammation afterward extends to the vessel wall and perivascular structures. From the researches of Prudden upon the localization of inflammatory processes after the intravenous inoculation of pyogenic organisms, it was known that such localization was determined by a lowering of local resistance, as by traumatism. That the traumatism might, at times, be slight, was shown by the occurrence of endocarditis during a septic puerperium, in which the only cause of injury which could be assumed was the normal closing of the valves or the impact of an embolus against them. In the present case, though no thrombus was found in the larger peripheral veins, it seemed not unlikely that an embolus was detached from a thrombus in a smaller vessel, which was not discovered, and, striking the wall of the pulmonary artery, determined the occurrence and location of the thrombosis. The shortness of breath, which preceded death for several days, might be explained by the gradual formation of the thrombus.

Dr. LARKIN said that the shortness of breath for several days before death was an unusual symptom in these cases of pulmonary thrombosis, and would appear to indicate that the obstruction had formed slowly.

Dr. COLEMAN said that he believed the coagulation had first occurred at the side of the vessel, and that the lumen had been gradually encroached upon and finally completely occluded. In another case, in which death had occurred in five minutes, a large embolus had been dislodged from a thrombus in the right ventricle and had immediately closed one of the large branches of the pulmonary artery, causing almost instant death.

Dr. LARKIN said that some months ago he had presented a specimen of thrombosis of the pulmonary artery. In this case, the woman had done well for eight or ten days after confinement, and had then suddenly dropped dead. Here, he had been unable to find any change in the endothelial lining which would account for the thrombosis. Unquestionably the specimen just exhibited under the microscope showed that the primary changes in this instance had occurred in the endothelium.

Stated Meeting April 28, 1897.

JOHN SLADE ELY, M.D., PRESIDENT.

DISEASE OF THE CORONARY ARTERIES WITH RED INFARCTION OF MYOCARDIUM.

Dr. JOHN H. LARKIN presented specimens taken from a woman, forty years of age, a chronic alcoholic, who had had several attacks of acute rheumatism. Four months ago she became lame, and the ankles were much swollen ; the breath was short, and there was slight and gradually increasing cough. She also complained of weakness, headache, and some gastric pain. Later, there was a good deal of blood-tinged expectoration. Five weeks ago she entered the hospital. The heart was enlarged, and there was a systolic murmur at the apex, and one at the base, with a systolic

thrill. There were cough, and profuse, frothy expectoration. No tubercle bacilli were found in it. There was occasional vomiting for a week or two before death, but no elevation of temperature. The urine had a specific gravity of between 1020 and 1030, and contained a trace of albumen, but no casts. At the autopsy, the lungs showed brown induration, with multiple hemorrhagic infarcts. The liver was " nutmeg." The spleen contained fresh and old infarcts. The kidneys showed the lesions of chronic diffuse nephritis, and also old infarcts. The coronary artery was occluded by an embolism. On the inner surface of the endocardium, both on the papillary muscle and on the mitral valve, were numerous vegetations, some of which could be seen hanging by thread-like processes. One of these vegetations was removed from the mitral valve, and also a small, white thrombus from the coronary artery. Microscopical examination proved these to be identical in structure. At the apex of the right ventricle was a large globular thrombus filled with a milky fluid. Dr. Norris had made cultures from the thrombus, and also from the ·heart muscle, with negative result, even after several weeks. In the region supplied by the anterior coronary artery — the tip of the left ventricle and portion of right ventricle—was a distinct area of softening in the cardiac muscle. There was no interstitial myocarditis. The heart was otherwise fairly normal, except for the increase in size, due rather to dilatation of the left ventricle than to hypertrophy with dilatation. Sections of the cardiac muscle were exhibited under the microscope. They showed very well the large effusion of blood into the heart muscle, displacing the muscular fibres of the heart. There was also some compression atrophy of the heart-muscle fibres in the immediate vicinity of the hemorrhage.

ATROPHY OF THE PANCREAS WITH REPLACEMENT BY FAT.

Dr. LARKIN then presented sections of the pancreas from a woman, fifty years of age, who had been admitted to Bellevue Hospital in November, 1896. She was addicted

to the use of beer, tobacco, and morphine. She said that
she had been well up to one month previous.   Then she
had chills and headache, followed by fever, thirst, and weak-
ness.   On admission, there was slight cough with dyspnœa
on exertion.   She passed large quantities of urine.   The
bowels were constipated, and the appetite fair.   Thirst was
marked ; the mouth was dry, and the tongue cracked. The
temperature was 103° F., pulse 112, and respirations 36.
Physical examination showed the chest to be barrel-shaped ;
there was diminished and prolonged low-pitched expiration,
and a few subcrepitant râles were heard over the back. The
size of the heart was normal, but its action was very irregular
in force and frequency.   No murmur could be heard.   The
liver was not palpable.   The spleen was normal.   The urine
had a specific gravity of 1012, and contained a trace of albu-
men and some granular casts.   One drop of the urine gave
a pronounced reaction with Fehling's test at one time, but
not at other examinations.   At the autopsy, the brain was
"wet"; there was moderate atheroma of the arteries of the
base ; the anterior portion of the pia mater was lustreless.
The heart was very pale, and exceedingly fatty ; there were
no valvular lesions.   The lungs were emphysematous, and
œdematous posteriorly at the base.   The spleen was hard,
large, and congested.   There was a large nutmeg liver.   The
kidneys were of normal size; the cortex pale, and markings
fairly distinct.   Connected with the left kidney was a tumor,
the size of a small orange, containing a viscid fluid. At the
edge of this tumor was a blood-vessel apparently connected
with the renal artery.   Cultures made from the viscid con-
tents of the tumor proved negative as regards tubercle bacilli,
etc.   The pancreas measured transversely about 2 ctm.   It
was much diminished in size, the greater portion of the pan-
creatic tissue being replaced by fat which appeared as large,
yellowish areas shutting off little islands of pancreatic tissue.
The small tumor was a telangiectatic sarcoma.

The PRESIDENT said that Dr. Larkin, in speaking of the
structure of the thrombus in the coronary artery being iden-

tical with that of the vegetation on the mitral valve, had expressed the opinion that the occluding mass was an embolus. To this he could hardly agree, as it seemed to him the mechanical difficulties would be enormous, owing to the course of the blood current, and the peculiar manner in which the coronary arteries are given off behind the mitral valve, and at right angles to the course of the blood in the aorta. On *a priori* grounds merely, it seemed to him that embolism of the coronary artery should be extremely rare. As to the occurrence of sudden death in disease and occlusion of the coronary artery, in his opinion it would make a very great difference which coronary artery was occluded, as to whether or not sudden death occurred. Why should the heart suddenly stop beating simply because one of the branches of the coronary artery going to the apex had become occluded ? An occlusion of the branch running upon the heart in the auriculo-ventricular ring might cause sudden death, because that is the situation of the intrinsic cardiac ganglia. It seemed, therefore, that for absolute and sudden stoppage of the heart, the determining factor, where there is no rupture, must be the degeneration, impairment, or cessation of the function of these intrinsic cardiac ganglia. Experiments apparently confirming this view had been published. On the other hand, if the circulation of the horizontal branch were left intact, stoppage of the branch going to the apex might occur without seriously affecting the intrinsic cardiac ganglia.

Dr. JAMES EWING said that last summer a man, forty or fifty years of age, had come under observation, who was addicted to the use of enormous amounts of morphine hypodermically. Shortly after one excessively large injection, he died. The autopsy showed a well-developed adipose layer all over the body, and a large amount of peri-renal and retro-peritoneal fat. With some difficulty the pancreas was found in the mass of fat. On section it was found that the organ was the seat of fatty replacement. The remaining islands of pancreatic tissue were apparently normal.

Stated Meeting, May 26, 1897.

JOHN SLADE ELY, M.D., PRESIDENT.

LIPOMA OF THE DIAPHRAGM.

Dr. LEWIS A. CONNER presented several specimens.   The first was a fatty tumor which projected from the diaphragm into the left pleural cavity.   It was found at an autopsy on an old woman, dying of cerebral hemorrhage.   The tumor was situated a little to the left of the cardiac apex, and more posteriorly.   It measured 4 by 3 ctm., was sessile, and was covered with the diaphragmatic pleura.   On the under side was to be seen what appeared to be a deficiency in the diaphragm, which might possibly explain the origin of the tumor.   There were no adhesions to the surrounding organs beneath the diaphragm, or evidence of attachment to the omentum.   This was the first time that he had met with a tumor in this situation.

MALIGNANT ENDOCARDITIS.

The next two specimens were hearts exhibiting the lesions of endocarditis.   The first one had been taken from a laborer, thirty years of age, who had been admitted to the Hudson Street Hospital on December 2d.   He had had rheumatism years before, and had been told that there was some cardiac affection, but it had caused him no inconvenience.   Shortly before death he had been suddenly attacked with irregular chills, fever, and sweating, and on admission had a temperature of 104.4° F.   The heart dulness was increased, and at the apex were to be heard a diastolic thrill and murmur and all the signs of an old mitral stenosis.   The spleen was enlarged and there were a few spots over the abdomen which resembled the eruption of typhoid fever—indeed both the tongue and the general appearance of the patient suggested this disease. Examination of the blood showed no malarial organisms. A specimen of the blood was sent to the Board of Health, and was reported to have given the typhoid reaction with the serum test.   A few days later, a distinct double murmur

developed over the base of the heart, in the aortic area, and the pulse became harder. A diagnosis was then made of endocarditis. He lived ten days longer, and during this time the character of the murmur changed. During the last three or four days there were distinct pericardial friction sounds. With the exception of the chills, the clinical picture was that of typhoid fever. At autopsy, the pericardium was found to contain ten ounces of red fluid, and the parietal and visceral layers were injected and everywhere covered with a thin layer of fibrinous exudate, giving a granular appearance to the surface. The heart was moderately enlarged ; its cavities were all dilated ; the muscle was rather soft. The mitral orifice admitted only the tip of the little finger ; the valve was much thickened and the chordæ tendineæ were shortened. At the base of the posterior cusp of the mitral valve was a soft, recent, reddish thrombus, measuring 2 ctm. at the base, and 1 ctm. in thickness. On the anterior cusp of the aortic valve, midway between the mitral and aortic valves was a large whitish vegetation, measuring 2 ctm. at the base, and 1.5 ctm. in thickness. The cusp was considerably thickened, and the sinus of Valsalva was greatly enlarged by what appeared to be an aneurismal dilatation. This formed a prominence on the wall of the left auricle, corresponding to the seat of the first mentioned thrombus. The other valves were normal. Both kidneys contained a number of small yellow infarcts. The aneurismal pouching of the sinus of Valsalva was evidently the cause of the thrombus, although there was no perforation.

The next specimen showed a malignant endocarditis affecting the pulmonary valves. The specimen had been removed from a woman, thirty-eight years of age, who had been admitted to the New York Hospital after an illness of a few days. She had had several chills, and at the time of entering the hospital presented the clinical picture of a lobar pneumonia. This was the diagnosis made in the hospital. A loud systolic murmur was heard over the base of the heart. The autopsy showed the spleen to be

enlarged to three times its normal size.   The kidneys were normal except for some cloudy swelling.   There were areas of recent exudation over both pleural surfaces.   The left lung contained two areas of hemorrhagic infarction in the lower lobe.   In the centre of each small area of broken-down tissue in the right lung were several small, but similar areas of infarction, and near some of these emboli were found in the branches of the pulmonary artery.   In the lower part of the upper lobe there was quite an extensive area of consolidation, with an area of softening in the centre.   The heart itself was about of normal size.   The mitral, aortic, and tricuspid valves were apparently normal.   There was a mass of fresh, friable vegetation arising from the posterior and under surface of the pulmonary valve.

The speaker called attention to the great difference in the clinical picture in the two cases of endocarditis.   Vegetations, he said, were very much more common on the left side of the heart than on the right.   When the left side of the heart was involved, emboli were washed into the general circulation, instead of into the pulmonary circulation; hence the great difference in the clinical picture in the two classes of cases.

Dr. WARREN COLEMAN said that he had seen several cases of malignant endocarditis occurring on the right side during the puerperium.   He had never seen the pulmonary valve so affected.

The PRESIDENT said that he had seen a few cases in which the pulmonary valve had been affected.   Naturally, in these cases pulmonary emboli were also found.

Dr. CONNER said that in the case he had reported there had been no evidence of an outside infection—in other words, it was a secondary process.   The streptococcus pyogenes was found in each of them.

ANEURISMS OF THE AORTA—RUPTURE.

The next specimen presented by Dr. CONNER consisted of a remarkable series of aneurisms of the aorta.   It had been

taken from an old man, seventy-three years of age, who had been admitted to the Hudson Street Hospital on March 14, 1897, in a state of coma. The man had been found ill in the street, but had been able to walk to the police station. A few hours later, he had been removed to the hospital in an ambulance. No complete physical examination was made before his death, which occurred in a few hours. At the autopsy, the left pleural cavity was found completely filled with clotted and fluid blood. The pericardium and heart were displaced to the right beyond the median line. Occupying the normal position of the heart, and pushing forward the parietal pleura in that region was a rounded tumor, the size of a large orange. The left lung was completely collapsed, and its apex converted into fibrous tissue. The apex of the right lung showed some fibrous nodules and tuberculous deposits. The heart was extremely small; its valves were apparently competent. The aorta, from its beginning to its passage through the diaphragm, was enormously dilated, and converted into a series of irregular pouches, the largest being 10 ctm. in diameter. About 20 ctm. from the aortic valve, in the upper part of the descending aorta, was a transverse, linear rupture, about 3 ctm. long. The sac contained for the most part fluid blood. The dilatation of the aorta continued down to within about six or seven centimeters of the bifurcation. The intima of the aorta everywhere was the seat of atheroma and calcareous deposits.

Stated Meeting, October 13, 1897.

T. MITCHELL PRUDDEN, M. D., in the Chair.

LARGE ANEURISM OF THE MIDDLE CEREBRAL ARTERY.

Dr. GEORGE P. BIGGS presented an aneurism of the middle cerebral artery, of unusual size. It had been taken from a male, sixty-five years of age, a watchman by occupation. He was found sitting in a chair, leaning far over to

the left side, the left arm hanging helpless. He talked with great difficulty, and stated that the attack had begun with a very marked vertigo. He had succeeded in reaching a chair before falling. Soon after he was discovered, he became speechless. The breathing was very slow and irregular, and the face was flushed. Both pupils were contracted, the right one slightly more than the left. The pulse was 64 and regular. The radial arteries were hardened. The urine had a specific gravity of 1013, and contained a trace of albumen, but no casts. The paralysis of the left side gradually increased and extended to the left leg. He became comatose, and died on the second day after his admission to the Hudson Street Hospital. The clinical diagnosis was cerebral hemorrhage.

On autopsy, aside from the lesions inside of the cranium, there were marked congestion and œdema of the lungs, and quite advanced chronic diffuse nephritis. On opening the skull, the dura was found to be extremely tense. There was a thin subdural clot over the base and over the lower part of the outer surface of the right hemisphere of the cerebrum— in other words, a moderate amount of subdural hemorrhage. There was a marked prominence of the middle portion of the right hemisphere. Beneath the pia over the right side, especially over the region of the right Sulvian fissure, and over the base of the brain, and the temporo-sphenoidal lobe, there was a very extensive hemorrhage. The ventricles were empty. On cutting into the right hemisphere, a very large hemorrhage was found just outside of the lateral ventricle. It measured about 7 ctm. antero-posteriorly, 5 ctm. vertically, and 5 ctm. transversely. At first, this appeared to be an ordinary cerebral hemorrhage, which had apparently broken externally, the hemorrhage having taken place first in large amount beneath the pia, and then broken out, producing the subdural clot. There was, however, a very decided hardness of the middle cerebral artery in this fissure. This was taken out, the clot carefully removed, and the aneurismal sac dissected out. This aneurism measured 1

ctm. in length and $\frac{3}{4}$ ctm. in diameter, and was ovoid in
shape.   There was a large, ragged tear on the superior sur-
face, through which the hemorrhage had occurred.   The
aneurism was located in the middle cerebral about 1.5 ctm.
from the origin of the vessels.

The points of interest in the case were, the unusual size of
the aneurism—larger than any that he had previously seen
upon a cerebral vessel—and the fact that on first examina-
tion it had so closely resembled an ordinary cerebral
hemorrhage.

TUBERCLE BACILLI FOUND IN THE FÆCES.

Dr. GEORGE P. BIGGS also presented microscopical speci-
mens from a case of ordinary pulmonary tuberculosis of
several months' standing, in which the attending physician
had found tubercle bacilli some time before.   In the past
month the patient had developed a diarrhœa, which had been
clinically diagnosticated as due to tuberculous involvement
of the intestine.   The patient, being very anxious about it,
it was suggested that an examination of the stools should
be made for tubercle bacilli.   The examination showed the
presence of a distinct mass of purulent matter, and its na-
ture had been verified under the microscope.   On staining it,
several tubercle bacilli were revealed.   The idea of making
such an examination had at first seemed to him ridiculous,
but it was interesting to note that the search had been
successful.   It might be assumed by some that the mass was
really a mass of sputum that had been swallowed.

MALARIAL PARASITE OF THE QUARTAN TYPE.

Dr. HENRY HEIMAN exhibited under the microscope the
quartan parasite, obtained from a patient in Little Rock at
his request.   He had been very anxious to find the quartan
parasite, but had never found it in specimens secured in
New York City.   The specimen presented exhibited a
parasite, such as he had never seen before, and the clinical
history indicated the quartan type of malaria.   The patient

was a boy of eleven years, who had suffered from malaria for a year or two. At first, the malaria had assumed the quartan type, but later on the boy had had chills every second day, or even every day. This might be accounted for by supposing that he had had several infections of the quartan parasite. In this parasite, the red cell was not swollen. The pigment was located more in the periphery of the organism, but the organism itself appeared smaller. As it was believed that the spores were the most characteristic and distinguishing feature, it was unfortunate that they were not found in this specimen. In the tertian, seventeen to twenty spores were supposed to be in one parasite, and in the quartan, from six to seven of these spores. He had been unable to confirm the statement that the pigment was coarser in the quartan.

ADENO-MYOMATA OF THE UTERUS.

Dr. T. MITCHELL PRUDDEN.—A considerable number of cases have been reported in late years of uterine myomata or fibro-myomata, in which glands of the uterine type were present, sometimes with cysts. These myomata may be either subserous, intraparietal, or submucous. They are sometimes directly connected with, and the gland structures are evidently derived from, the uterine mucous membrane. But they are often so distant and so entirely separated from the mucous membrane, as to justify the conjecture that they are derived from some embryonal abnormality associated with the development of the Wolffian body. These tumors form the subject of a monograph by V. Recklinghausen, and have been discussed, with a description of new cases, by Cullen, in volume vi. of the *Johns Hopkins Hospital Reports*.

I have brought in for demonstration slides from two hitherto undescribed cases. In neither of these cases was there anything especially noteworthy in the clinical history. One was from a private patient, thirty-four years old, whose uterus was removed, on account of a tumor, about 3 by 2 centm. in diameter, in the posterior wall of the cervix uteri ;

the other tumor was a polypoid growth about the size of a hen's egg, attached to the posterior wall of the uterus, discovered at the autopsy on an old woman of seventy-five, who died without definite clinical diagnosis, and was found to have had chronic diffuse nephritis, chronic interstitial hepatitis, and carcinoma of the left ovary.

In both cases, a series of sections was made with a view of discovering some connection between the glandular elements of the myomata and the uterine mucous membrane, but without success.   It will be seen that the bulk of the tumors consists largely of fibrous and smooth muscle tissue, the former preponderating.   This mass is moderately dense and moderately vascular.   Scattered irregularly and, in the whole, sparsely through this fibrous and muscle mass are small collections of gland-like structures resembling islets of uterine mucous membrane.

The glands are follicular in type, are lined with cuboidal and low, cylindrical epithelium, and resemble those of the mucous membrane of the body of the uterus.   Some of the gland lumina are distended with granular material to form minute cysts lined with flattened epithelium.   Between and surrounding these glands, there is a very cellular stroma resembling that of the mucosa of the uterine body and merging gradually into the surrounding fibrous tissue.

I have presented these specimens, not because these tumors are very uncommon, but because they are not usually recognized, and as a contribution to the statistical data of this interesting growth.

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Stated Meeting, October 27, 1897.

WARREN COLEMAN, M.D., VICE-PRESIDENT, in the Chair.

TUBERCULOUS LYMPH NODES FROM A CASE OF CHRONIC
BRONCHITIS AND EMPHYSEMA.

Dr. J. H. LARKIN exhibited under the microscope a section of a lymph node taken from the root of the lung of a man, forty-five years of age, who had died of chronic bron-

chitis and emphysema. There had been no other tuber-
culous inflammation in the body. The autopsy showed
intense venous congestion of the kidney and a nutmeg liver,
with a few adenomata scattered throughout the liver.
Along the root of the lung the lymph nodes were very
much swollen. Around the pericardium they were also much
swollen, some of them being as large as a hazel-nut. A
thorough search was made in the lungs and other organs for
tuberculous foci, but none was found. On cutting open the
lymph nodes they were found to be nearly three-fourths
cheesy, the microscope revealing diffuse areas of cheesy de-
generation. Dr. Larkin said that he had ground up some
of these cheesy nodes with normal salt solution, and had
then injected 2 cc. of this fluid into each of three guinea-
pigs. After three weeks, one died, but the autopsy was
negative. The other two were killed at the end of eight
weeks, and in these animals the post-mesenteric glands were
very large and cheesy, and there were several small foci in
the liver and spleen. Some pseudo-tubercles were found
in the lungs. He had collected the lymph nodes from the
guinea-pigs, and had made sections of these also. One of
these sections from the post-mesenteric nodes was also
shown under the microscope, stained for tubercle bacilli.
The specimen exhibited several bacilli, which corresponded
morphologically with tubercle bacilli. The specimens were
presented because of the interest attaching to their occur-
rence in a case in which death had been due to chronic
bronchitis and emphysema, with no other evidences of
tuberculosis in the body. It would seem from the findings
in this case that the lymph nodes served not only as store-
houses for noxious products and various kinds of pigment,
but also as storehouses for bacteria—not only the ordinary
bacteria always found in the trachea, but for pathogenic
bacteria. The case also illustrated one of the ways in which
a person might become infected with the tubercle bacilli—
i. e., the bacilli first finding a lodgment in the lymph nodes,
and afterwards, probably as a result of some exposure to

some weakening influence, being distributed to the body
at large.

Dr. HENRY HEIMAN said that it was interesting to re-
call in this connection that Billroth thought he had observed
tuberculous meningitis follow operations on tuberculous
glands of the neck.

Dr. WARREN COLEMAN asked Dr. Larkin what was his
view of the ordinary channel of infection in the lung—
whether through the smaller bronchial tubes or first through
the lymph nodes.   He had in mind those foci of infection
so frequently met with at the apex of the lung.

Dr. LARKIN said he thought a large number of tubercle
bacilli might get in through the bronchi without passing
through the lymphatic channels, and might there set up a
diffuse tuberculous pneumonia. In other cases, a few tubercle
bacilli might be lodged in the lymph nodes and remain
quiescent for a longer or shorter period of time.   The anat-
omists had possibly thrown a little light upon this matter by
referring to the unequal angles of divergence of the bronchi
from the trachea.   This, of course, was only an attempt to
explain why tuberculous deposits occurred by preference in
the apices of the lungs, but did not explain the simultaneous
involvement of both apices.

Dr. COLEMAN said that a most plausible theory in con-
nection with the location of these processes at the apex,
and of the channel through which the bacilli passed, was
that which assumed that these organisms were taken up by
phagocytes and carried into the lymph channels, and that,
instead of remaining in the glands at the base of the lung,
they passed through these, for some unknown reason, and
were then carried through the lymph channels to the apex.

Dr. LARKIN said that in his case undoubtedly the bacilli
had been seized by the phagocytes and had gotten only as
far as the nodes ; but if the tubercle bacilli did get farther,
it was hard to understand why the apices should be selected
by preference.

Dr. JAMES EWING said that he could not see how the

lymph nodes at the base of the lung could play any part in the location of tuberculous lesions at the apex of the lung. All experimental studies regarding the reasons for the lodgment of tubercle bacilli in the apices by preference had led to the conclusion that it depended upon the character of the blood supply there, and upon mechanical conditions affecting the aëration of those parts of the lung.

Dr. COLEMAN said that the statement just made about the circulation of the apex might explain the lodgment of organisms there rather than in other parts. Some years ago, he had made some incomplete experiments bearing on this question. They consisted in making an animal inhale lampblack, and also in injecting this lampblack into the pleural sac. It was found in the course of half an hour that these pigment granules had been taken up from the trachea and large bronchial tubes, and had been distributed through the lymph nodes under the pleura and over the whole surface of the lung. These experiments had influenced him largely in arriving at the opinion already expressed.

Dr. LARKIN said that in autopsies on cases not supposed to be tuberculous, the lymph nodes received very little consideration, yet a large percentage of these lymph nodes in patients dying of diseases other than tuberculosis contained foci of tuberculous inflammation. The case from which his specimen had been taken was only one of a series of about thirty autopsies, in which lymph nodes which contained ordinary cheesy areas had been collected from the roots of the lungs.

Dr. COLEMAN said that an English observer had recently promulgated the theory that tuberculosis, when in a condition to be recognized by the physical signs, was really in its second stage, and that the infection not infrequently gained an entrance to the body through the alimentary tract and mesenteric glands.

AUTOPSY MADE MONTHS AFTER DEATH.

Dr. JAMES EWING presented the viscera from a case on which an autopsy had been made five months and eight

days after death. He was enabled to present this interesting material through the kindness of Dr. A. Jacobi, whom he had assisted at the autopsy. The clinical diagnosis had been tonsillitis and naso-pharyngeal hemorrhage; the anatomical diagnosis was peri-tonsillar abscess and retro-pharyngeal abscess, with rupture of the right internal carotid artery. An embalming fluid, of unknown composition, had been injected into the median basilic vein. The body had been interred in dry gravel in a wooden casket, surrounded by the usual outer box. The body itself was rigid, and the skin much desiccated, but the features were surprisingly well preserved.   There was a large abscess cavity around the tonsil and behind the pharynx, and about 1.5 ctm. above the origin of the internal carotid artery was an irregular opening, 5 ctm. in circumference, communicating with this cavity. The viscera were so desiccated as to be tough and almost cartilaginous. The spleen and kidneys were remarkably well preserved, and, strangely enough, with the ordinary methyl blue stain it was possible to demonstrate the presence of numerous colonies of cocci around the wall of the abscess cavity.

Dr. COLEMAN said that, in the only case of this kind that he had seen, the sections of the kidney were in as good condition as the specimen just presented, and the hardening was almost as perfect as if it had been done in the laboratory on small pieces of tissue.

Dr. LARKIN said that the most approved method of embalming at the present time seemed to consist in puncturing the different viscera with a trocar, instead of injecting the fluid into the vessels. Great care was taken to extract as much blood as possible.

Dr. EWING said that in the autopsy he had reported there had been no puntures in the skin or viscera.

PRESERVATIVE INJECTIONS IN THE INTESTINE.

Dr. HENRY HEIMAN said that about one year ago Dr. Henry Power had conducted certain experiments regarding

the value of formalin as a preservative in the intestine. Dr. Heiman said that he had varied these experiments by injecting 2 to 5 per cent. solutions of formalin into the rectum of five children who had suffered from gastro-enteritis. For comparison he had examined three cases of gastro-enteritis in which no formalin solution had been injected.   The injection had been made immediately after death.   It was found that by this early use of the formalin injection the mucous membrane was at once fixed for hardening purposes, thus preserving more epithelium, and giving a more clearly defined picture.   The autopsy could be made at the usual time. He had used an ordinary irrigator, and had found by experiment that the correct pressure was obtained by elevating the reservoir about six or eight inches only.   His plan was to sew the nozzle into the rectum and allow the fluid to run in for some time—twelve to twenty-four hours in some cases. The fluid would reach half-way up the ascending colon, and even the parts in close apposition to those injected became hardened.   Specimens were exhibited under the microscope, showing the gut in cases so treated and also those not preserved in this way. The solution used was a 2.5 per cent. solution, made from the ordinary commercial (40 per cent.) formalin solution.   It did not produce the shrinkage that other hardening fluids did.

Dr. Ewing said that he had followed the experiments of both Dr. Power and Dr. Heiman, and the results were certainly a marked improvement on the ordinary method of leaving the body until permission had been obtained for an autopsy.   The mucous membrane, muscular coat, peritoneum, etc.,—in fact, all except the *superficial* epithelium were well preserved.   It did seem, however, that the injection fluid did remove some of the superficial epithelium ; hence the specimens were not as perfect as those obtained from bodies in which the autopsy was made immediately after death, as after electrocutions. The method nevertheless was to be highly recommended for ordinary cases where one desired to examine the intestinal epithelium.

Dr. HEIMAN said that this method might be employed in diseases of the intestine. He wished here to acknowledge his indebtedness for Dr. Rowland G. Freeman for the material experimented upon.

Dr. COLEMAN said that the method had been applied recently at the Charity Hospital in cases of gastric carcinoma for the purpose of preserving the gastric mucous membrane for subsequent examination. The result should be even better than in the intestine because it would stop the self-digestion of the stomach.

Dr. LARKIN said that he looked upon formalin as a very tricky preservative, and it was unfortunate that experiments in this direction had not been made with some other preservative, as for example Müller's fluid. If formalin were used alone, the effect on the staining properties of cells was not as good as if a combination of formalin with alcohol, or Müller's fluid, were used.

Dr. COLEMAN remarked that it was generally admitted now that formalin caused swelling of the cell protoplasm, and hence destroyed the intimate structure of the cells to some extent.

Dr. HEIMAN said that when formalin was added to ordinary chest serum, he had found that it did not coagulate it. Wassermann had stated that the addition of formalin to serum prevented its coagulating when heated, and he had found that if egg-albumen were placed under the same cover with formalin it would become coagulated after a time. It was evident that formalin acted very differently on different albumens.

Dr. COLEMAN said that one of the chief virtues of formalin was, that it would coagulate the liquid in the alveoli in a case of pulmonary œdema, so that the condition might be demonstrated to students. He had not been able to do this with any other hardening agent.

At the meeting of November 10, 1897, the only specimen presented was by Dr. Henry Power—some material removed by curettage from a uterus. The clinical history pointed

toward an abortion. The material was exhibited under the microscope for a diagnosis. There was an informal expression of opinion in favor of it being placental tissue.

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Stated Meeting, November, 24, 1897.

WARREN COLEMAN, M.D., VICE-PRESIDENT, in the Chair.

PERITONITIS WITHOUT THE USUAL SYMPTOMS.

Dr. W. G. LE BOUTILLIER presented specimens from a case of supposed alcoholism and nephritis, in which the autopsy revealed an extensive peritonitis. He said that he was indebted to his colleagues at the J. Hood Wright Memorial Hospital for the specimens and the history of the case. The patient, a woman, twenty-nine years of age, had been brought to the hospital in the ambulance at 3 P.M. She had been found unconscious in the street, and, so far as could be ascertained, there had been no previous attack of this kind. Her general health had also been good On admission, the patient was profoundly unconscious, the pupils were moderately dilated and equal; the extremities were cold; the pulse was feeble, soft, and 70; respirations were 20; temperature was 99.2° in the rectum. The breath had a distinct odor of alcohol; the skin was dry and cold; there were no marks of injury on the face or body. The urine contained about 15 per cent. of albumen. At 5 P.M. she could be aroused by frictions along the intercostal region, but did not respond coherently to questions. At 6.30 P.M. the respirations became gasping, and the pulse imperceptible. In spite of the free use of heat and stimulants, and the infusion of four pints of normal salt solution, the temperature was 94.6° at 8 P.M., and one hour later clonic convulsions developed, which involved chiefly the face, but also the lower extremities to a lesser extent. The convulsions were repeated at irregular intervals up to the time of death. By midnight the temperature had risen to 99.8°, the pulse was 96, and the respirations 20. The case appeared to be one of

nephritis and alcoholism. At the autopsy general peritonitis was found, which was interesting in view of the low temperature and the absence of vomiting. The intestinal coils were distended with gas, and they, as well as the mesentery, were covered with a recent exudate. The bowel contained fluid fæces. The markings of the kidneys were distinct, and the capillaries, especially of the pyramids, were congested. The pelvic peritoneum surrounding the uterus and tubes was the seat of a recent exudate. The tubes contained a small quantity of pus. An examination of the brain revealed congestion of the pia mater, and an acute meningitis over the left frontal and parietal lobes. The anatomical diagnosis was peritonitis, originating in septic salpingitis, probably following gonorrhœal vaginitis and endometritis.

Dr. Le Boutillier said that he had presented this case because of the absence of elevation of temperature, and its important clinical bearings. Thus, in many cases in which the diagnosis of appendicitis was clear, the presence of a progressive peritonitis was by no means certain. It was possible to have a general peritonitis associated with very slight pain and rigidity of the abdominal muscles, with a normal pulse, and without vomiting ; yet the surgeon not uncommonly found that in a few hours the picture would be entirely changed, and on opening the peritoneal cavity a peritonitis would be revealed, which must have existed at first, without the usual signs and symptoms. An important lesson to be drawn from the case presented was, that it was not wise to consider coma and the odor of alcohol on the breath as sufficient grounds for a diagnosis of alcoholism.

Dr. WARREN COLEMAN said that Dr. Buxton had told him of an autopsy that he had recently made, in which there had been marked changes in the kidney, but cultures having been taken from the various serous fluids of the body, the staphylococcus pyogenes aureus was obtained from the peritoneal fluid without any evidence of inflammatory process either on the visceral or parietal peritoneum. The

question, therefore, arose, whether this organism was not virulent in that particular case, or whether the resisting power of the peritoneum had been sufficiently great to prevent the pyogenic process.

Dr. GEORGE P. BIGGS presented a number of specimens.

FALLOPIAN TUBE WITH TWO FIMBRIATED OPENINGS.

The first was a Fallopian tube with a double fimbriated opening, one at the usual site at the end of the tube; the other smaller and about 1 ctm. nearer the uterus. The specimen had been removed by operation from a woman, thirty-three years of age, because of a persistent salpingitis. There was slight, diffuse infiltration of all the layers of the wall, with inflammatory exudate.

GUMMA OF THE LIVER.

The second specimen was a gumma of the liver, removed from an Italian laborer, forty-four years of age, who had died at the New York Hospital from a fracture of the skull. At the autopsy, some gummatous deposits of unusual size were found in the liver. There were very thick adhesions over the site of these gummata, and the latter together formed a mass about 10 ctm. in length and 5 ctm. in diameter. There was an old cicatrix at the inferior portion of the urethra, but no other lesions that could be considered distinctive of syphilis.

HEART SHOWING LARGE FOSSA OVALIS AND OPEN FORAMEN.

The next specimen, taken from a woman of thirty years, was a heart in which the fossa ovalis was of unusual size. In the fresh state it measured nearly 2.5 ctm. in diameter. There was also a large, oval, membranous area in the septum between the auricles, sharply outlined, and at the anterior border at one point was a narrow, slit-like opening between the auricles, measuring about three-fourths of a

centimetre in the vertical direction.   So far as known, there were no symptoms during life bearing upon the condition. Death was caused by acute arsenical poisoning.

PANCREATIC CALCULI.

The fourth specimen was a pancreas from a woman, forty-eight years of age, a seamstress by occupation, who had died from acute carbolic acid poisoning.   The pancreas was quite small, measuring 15 ctm. in length, 1 to 2 ctm. in thickness, and 1.5 to 3 ctm. in width.   The first inch of the duct of the pancreas was normal and pervious, but beyond this point a probe touched some calcareous material.   On dissection, a large number of calculi were found distributed throughout the course of the pancreatic duct.   These measured from 1 to 5 millimetres in diameter, were rather irregular in outline, and many of them sent spine-like projections into the side of the duct.   Numerous other calculi could be felt in the smaller branches of the duct, but were not exposed in the incision.   There was very little pancreatic tissue left.   At the tail of the pancreas was a cyst, about 2.5 ctm. in diameter, fully distended with a milky fluid. The outer wall of this cyst was in such close relation to the spleen that the cyst was broken and the contents were under such great pressure that they were forcibly ejected and so lost.   It was not known whether any symptoms were produced during life by this condition.   Dr. Biggs only recalled having seen calculi in the pancreas in one other case, and in that one there were only a few present.

EXCESSIVE DEPOSIT OF FAT IN THE HEART; FAT NECRO-SIS; HEMORRHAGES IN OTHER ORGANS.

The next specimen was a heart, taken from a woman, sixty-three years of age, who had given a history of numerous attacks of emphysema for a period of eight years.   She had entered the New York Hospital with one of these attacks.   She was so very obese that the physical examina-

tion was very difficult. The heart sounds and pulse were feeble ; there was no elevation of temperature ; there was general œdema, with indications of a moderate quantity of fluid in the peritoneal cavity. She became steadily weaker and died shortly after admission. At the autopsy, the peritoneal cavity was found to contain 600 cc. of straw-colored serum ; there were numerous old pleuritic adhesions, together with general emphysema of the lungs and considerable acute œdema. The heart was presented, because of the unusual deposit of fat in this organ. It was at least 1.5 ctm. in thickness at the base of the right ventricle, and about 1 ctm. in thickness at the base of the left ventricle. The heart was considerably enlarged ; the cavities moderately dilated ; the valves were all normal. The muscular substance was of good color, but numerous deposits of fat could be seen scattered through the muscular fibres. The right side of the heart showed moderate hypertrophy. Microscopically, the heart muscle revealed a considerable degree of parenchymatous degeneration and a moderate degree of fatty degeneration, chiefly in the form of infiltration extending downward in lines from the surface.

The pancreas from the same case showed an early stage of fat necrosis, with recent hemorrhages—an earlier stage than any he had before seen. The abdominal fat was excessive, yet there was no evidence here of fat necrosis. In the pancreas, however, the fresh section showed numerous small points of necrosis, and scattered rather diffusely through the pancreas were comparatively recent hemorrhages infiltrating through the pancreatic tissue. The pancreas was only very slightly enlarged. In the stomach, duodenum, and jejunum was a very extreme congestion of the mucous membrane, more marked in the two latter than in the stomach. There was fluid blood also in moderate quantity in the interior of these organs. There had been a number of hemorrhages from the mucous membrane, but there was no evidence of this having been brought about by any acute irritant. The congestion became less marked towards the lower part of the

intestine, although all of the abdominal organs were considerably congested. In the stomach, along the summits of the rugæ, were numerous small superficial depressions, which at first glance suggested superficial ulcerations. Along the edge of these depressions were slight deposits of pigment, indicating that these were the sources of the hemorrhages. He had no explanation to offer for the existence of these hemorrhages.

Dr. DONALD M. BARSTOW asked if, in the first case, there had been a corresponding condition in the other Fallopian tube.

Dr. BIGGS replied that as the specimen had been removed by the surgeon he could not say.

Dr. COLEMAN asked how frequently the valve-like opening had been found in the heart.

Dr. BIGGS said that he had seen it a number of times, but he did not think much leakage occurred through such a slit-like opening in the natural state of the parts. The case had been presented chiefly on account of the large size of the membranous area.

Dr. COLEMAN suggested that in the case of pancreatic calculi a fat necrosis might have been the starting-point. Fitz, he believed, had made the statement that these necrotic areas sometimes underwent calcification.

Stated Meeting, December 8, 1897.

WARREN COLEMAN, M.D., VICE-PRESIDENT, in the Chair.

ECHINOCOCCUS (?) CYST OF THE LIVER.

Dr. JOHN H. LARKIN presented a liver taken from a man, eighty-three years of age, who had enjoyed good health previously. There was no history of traumatism. In addition to the senile atrophy present in the liver, there was on the upper and posterior surface of the right lobe a large cyst, measuring 5 by $3\frac{3}{4}$ inches. The cyst wall was very dense and calcareous, and the contents were composed

of gelatinous material which, on examination, was found to consist of fat, with cholesterin and tyrosin crystals and fatty epithelium. The diaphragm was adherent and formed the upper portion of the cyst wall. The cyst contents were examined for echinococcus hooklets, but none were found. Nevertheless, it was probable that this was a form of sterile echinococcus cyst of the liver.

PURULENT PERICARDITIS ; OPERATIVE TREATMENT.

Dr. Lewis A. Conner presented a specimen from a case of purulent pericarditis. The patient was a sailor, thirty-seven years of age, who had come under his care at the Hudson Street Hospital on March 9, 1897. The family history was negative. There was a moderate alcoholic habit, but he had had no serious previous illness. His last sickness began three days prior to admission, with sharp, lancinating pains in the chest, vomiting, and malaise, but without any chill. The next day there was a slight cough. On admission, he complained of pain across the whole front of the chest ; his temperature was 104.8° F., respirations 32, and pulse 120. The physical examination showed some dulness at the right base posteriorly, over an area of three inches, with feeble breathing. On the left side, near the spine of the scapula, were dulness, prolonged high-pitched respiration, and exaggerated voice and whisper. Over both sides were many sibilant and sonorous râles. The area of cardiac dulness at that time was normal. The urine was normal except for the presence of some red cells. For eleven days he presented the picture of a severe broncho-pneumonia. There was a good deal of dyspnœa and cyanosis, and the cough was frequent. The sputum was examined several times without finding any tubercle bacilli. About ten days after admission his breathing improved, although his morning temperature was 101°, and the evening temperature 105°. He had had no chills. On the eleventh day the first sign of cardiac difficulty appeared. The cardiac sounds were decidedly fainter, and the impulse less distinct. On March 22d

the diagnosis of pericarditis with effusion could be positively made. The dyspnœa and cyanosis were then more marked. Two days later, his condition having become much worse, it was decided to aspirate. This was done in the fifth space on the left side, midway between the left border of the sternum and the nipple line. About 900 cc. of fairly thick, offensive pus were evacuated. Within half an hour Dr. Stimson made an incision, under cocain anæsthesia, over the site of the puncture, and removed about one inch of the cartilage of the fifth rib. What was at first supposed to be the pericardium proved on closer inspection to be a reduplication of the pleura. The pericardium was opened, and about 200 cc. more of pus evacuated. The relief afforded by the operations was very striking. There was no evidence of shock after either operation. The patient's color and breathing were better for two or three days, but the temperature remained high. The wound was drained with two large tubes, and irrigated daily. The discharge was quite free. Six days after operation the patient became delirious, and died on the eighth day after the operation. The autopsy showed the pericardium adherent to the sternum and the pleura. It contained only a small quantity of pus. There was a small opening communicating with the left pleural cavity, which contained a sacculated empyema over the anterior surface of the left lung. This contained 100 cc. of thick, yellow pus, and had evidently been very imperfectly drained. The heart showed nothing abnormal in its interior. There were old adhesions over both lungs, but no evidence of any consolidation. The bronchi contained a good deal of muco-purulent secretion. There was moderate paren-chymatous change in the kidneys. The original point of infection could not be discovered. Cultures showed a pure growth of the Fraenkel diplococcus.

Dr. Conner, in commenting on the case, said that the symptoms and physical signs had been those of a pulmonary lesion only. As these signs had improved, evidence of cardiac involvement had developed. It was strange that

the incision should have opened the pleural cavity. Dr. Roberts, of Philadelphia, had published in the last number of the *American Journal of the Medical Sciences* an exhaustive article on purulent pericarditis and the operative indications, giving a summary of about thirty-five reported cases that had been operated upon. Among these were a number in which the same accident had occurred as in the case just reported. It seemed evident that if the point selected for operation was outside of the internal mammary artery, yet well within the nipple line, there was always danger of infecting the pleura. A much safer site for the puncture was just to the left of the base of the xiphoid cartilage, between that and the free border of the ribs, the needle being passed obliquely upward. The chances of recovery seemed to be distinctly good if the accident mentioned were avoidable. Thus, of the thirty-five cases referred to, fifteen recovered, which was a very much better showing than from the non-operative treatment.

FIBRINOUS HEMORRHAGIC PERISPLENITIS.

Dr. WARREN COLEMAN presented a spleen that was so adherent to the diaphragm that it had to be removed with it. The measurements of the spleen and attached diaphragm were 17 by 11 by 6 ctm., and the weight was one pound and three-quarters. On making a longitudinal section through the organ, a moderately large amount of sanguineous liquid escaped from a cavity to be described later. It was found that the mass was made up in part of other than splenic tissue. The spleen itself measured 14 by 9 by 3 ctm. Outside of the spleen and between it and the diaphragm was a moderately dense layer of new tissue, apparently a fibrinous deposit, which was divided approximately into two equal halves by a thin and more perfectly formed membrane. Between these two halves the cavity above referred to had formed. The adventitious layer measured 3 ctm. in its thickest portion. It covered the whole of the diaphragmatic surface of the spleen, and that surface only, thinning away

somewhat as it reached the margins.   From the pressure of the dividing layer it was assumed that the new tissue was deposited at two successive times.   Cultures taken at the autopsy were negative, only putrefactive organisms being present.   Sections of the new tissue show that it is composed of a meshwork of fibrin enclosing red-blood cells. The capsule proper of the spleen has been invaded by small round cells, and the bundles of connective tissue have been separated from each other, giving a somewhat reticular appearance.

The patient was a woman, thirty-five years of age.   The cause of death was lobar pneumonia.   The heart weighed ten ounces ; its walls were pale and soft.   The mitral valve showed an increase of connective tissue along its free margin. The coronaries were normal.   The left pleural cavity was partially obliterated, the result of an old pleurisy ; the right was wholly obliterated from the same cause, and the costal pleura was much thickened.   The bronchial lymph nodes were enlarged, pigmented, and tuberculous.   There was pneumonic consolidation of the whole of the right lung, the process having commenced in the middle lobe and upper part of the lower, and then extended.   A little blood was present in the pelvic cavity, but was believed to have come from the omentum.   The kidneys presented the changes of extensive parenchymatous degeneration, with a moderate connective-tissue increase in places.   Each kidney had two ureters, which united a short distance above the bladder.

ANEURISMAL DILATATION OF THE PULMONARY VALVE.

Dr. COLEMAN also presented a specimen showing aneurismal dilatation of the pulmonary valve.   It was taken from a woman, about fifty years of age, who was found dead.   The cause of death was general pulmonary tuberculosis, which had originated in an old process at the left apex where a small cavity had formed.   Miliary tubercles were scattered throughout the rest of both lungs.   The lungs were likewise emphysematous.   There was no lesion in the pulmonary

arteries macroscopically demonstrable. The heart had stopped in diastole, and both sides were filled with dark coagula. All three cusps of the pulmonary valve presented the changes of chronic fibroid endocarditis, especially marked in the left anterior cusp, which was the seat of the dilatation. Here, the connective-tissue increase was most pronounced. The dilatation was greatest about the middle of the cusp, below the corpus Arantii. The cusp at this point projected about 3 mm. farther into the lumen of the arterial ring than normal. The right ventricle was distinctly hypertrophied and dilated. The only discoverable lesion which could have tended to produce the changes in the valves was emphysema, with its vascular changes. The tuberculous process at the apex was not sufficiently extensive or sufficiently fibroid to have raised the blood pressure in the pulmonary circuit to any extent. As already stated, there were no atheromatous changes in the larger divisions of the pulmonary artery. The changes in the smaller branches of the pulmonary artery, however, must have been more extensive than was ordinary in emphysema. Emphysema with right heart hypertrophy is comparatively common; changes in the pulmonary valve, very rare.

The nature of the lesion in the valve was such that it could not have given origin to any symptoms or signs during life. Affections of the pulmonary valve are very rare, and usually congenital. The valve had been the seat, however, in adults of simple acute and malignant endocarditis.

Dr. J. G. ADAMI, of Montreal, asked if there had been any disturbance in the spleen itself, or if the disturbance had been sharply defined from the spleen substance.

Dr. COLEMAN replied by exhibiting specimens under the microscope. They showed nothing abnormal in the splenic tissue.

Dr. ADAMI said that the nearest approach to such a condition that he had met with was in a case of fibroid pneumonia with bad resolution. The post-mortem showed the left lung to be firmly adherent to the diaphragm, and in one

portion, a small gangrenous area. The spleen was separated from the diaphragm by a thick mass similar to that described in Dr. Coleman's specimen, and in the middle of this mass there was definite suppuration. Along the splenic vein, near the pancreas, was another small abscess, and there were also multiple abscesses in the liver. It seemed to him that there must have been a microbic infection from the lung to the perisplenic tissue, setting up suppuration, and thence through the splenic vein to the liver.

Dr. COLEMAN said that in his case the pneumonia was on the right side, and there was no lesion found except an enlargement of the spleen, which was soft and dark. There was an old interstitial pleurisy which did not entirely obliterate the cavity.

SUBGLOTTIC ABSCESS; DEATH FROM ŒDEMA OF THE GLOTTIS.

Dr. JAMES EWING presented a larynx taken from a case of subglottic abscess, which had had a rather sudden and fatal termination from general œdema of the glottis. The history was very imperfect, and was obtained only from the family. The patient had been taken sick with the ordinary symptoms of cold, four days before admission to hospital. He suffered from pains in the joints, but principally from a sore throat and slight cough with scanty mucoid expectoration. He was not considered seriously ill at first. Examination showed considerable swelling around the base of the epiglottis, but not much obstruction of the rima glottidis in spite of the presence of considerable dyspnœa. Shortly after admission, the dyspnœa increased rather suddenly, and became markedly stridulous. Operative interference of any kind was declined. He suddenly became unconscious, and a hurried tracheotomy was performed, but it did not save him. At the post-mortem examination there was nothing of special interest in the body, such as tuberculosis or syphilis. There were the ordinary post-mortem findings of previously existing and severe general œdema of the epiglottis and of

the whole of the larnyx. The mucous membrane of the vocal cords was white and thick, and being very anæmic resembled somewhat a false membrane. On careful examination, behind and below the posterior attachment of the right vocal cord, a small opening was found in the mucous membrane, which communicated with a small abscess cavity containing creamy pus. On section, an abscess cavity, measuring about 1 ctm. in diameter, was found, which was lined with the ordinary pyogenic membrane. This was the only inflammatory lesion of importance in this region. Cultures made from the pus showed no Klebs-Loeffler or tubercle bacilli, and sections of the wall of the abscess cavity showed ordinary granulation tissue. There was no history or other evidence of syphilis or tuberculosis; hence the case seemed to be one of simple primary abscess arising probably from the larynx. The object in presenting the case was to place on record a rather rare termination of laryngitis.

FILARIA SANGUINIS STAINED.

Dr. Ewing exhibited under the microscope a slide, showing the filaria sanguinis. He said that he was indebted to the authorities of the New York Hospital, and especially to the house physician, for the specimen. An interesting feature in it was the very satisfactory staining. The smears were made in the ordinary way, fixed in alcohol and ether and stained with methylene blue. The structure of the filaria was in this way very beautifully brought out. The granular structure of the body was thus made evident, and when examined dry, without any mounting medium, the envelope of the filaria could be plainly seen. This disappeared when the specimen was mounted in a medium having a higher refractive index than air. He had searched very carefully, but in vain, for the cilia described by some writers as attached to the sheath of the filaria. The method of preparation just described was a good way of preserving such a specimen permanently.

In answer to a question from Dr. Adami, Dr. Ewing said

that the specimen presented was certainly much larger than
the filaria most commonly seen.

Dr. ADAMI said that as there was reason to believe that
there is a new species of filaria in the West Indies, all cases
of the kind coming from there should be very carefully
examined.

TUBERCULOUS DISEASE OF THE VERTEBRÆ.

Dr. V. P. GIBNEY presented a specimen showing tubercu-
lous disease of the vertebræ. It had been removed from a
boy, who was ten years of age when admitted to the hospi-
tal on July 16, 1895. He had been suffering from spinal
disease for a long time previously. Examination showed a
moderate kyphosis in the lower dorsal and first lumbar ver-
tebræ. Shortly before admission a psoas abscess had de-
veloped on the right side. This was tapped, but the fluid
was too thick to pass through a large needle. About a
month later, the abscess was opened, and from four to six
ounces of thick, caseous pus were removed. A month after
this, the opening was enlarged and the curette passed
upward into the lumbar vertebræ, and bits of bone removed
from the vertebræ. The sinus remained open from that
time on, and the case steadily grew worse. It was reported
as an example of the failure of excellent hygienic surround-
ings to induce a good reparative process. In the summer of
1896 this boy had spent four or five months continuously
in an excellent summer hospital at Englewood, where he
had had every advantage. A few months later, he had been
sent to the country for the winter. His back was well pro-
tected by a jacket, he was out-doors a good deal, and had the
best of air and nourishment. Last summer he was also in
. the country. In spite of these advantages, the sinus stead-
ily discharged, and the liver began to enlarge. Last sum-
mer he presented symptoms of what was considered by
some of the consulting staff to be pulmonary tuberculosis.
The child died on December 6th, and the autopsy was
made by Dr. Buxton. On section of the spinal column,

comparatively a small area of disease was found, and only a few loose pieces of bone. The lungs were absolutely normal, except for general atalectasis resulting from pressure of the diaphragm and the enormously enlarged liver. The brain was not examined. The heart was normal. The pericardium contained about four ounces of fluid. The pleura was slightly adherent ; its external surface was smooth ; there were no tubercles. The bronchial lymph nodes were enlarged and calcareous. The abdomen contained six or eight ounces of fluid. The spleen was enlarged and pale. The kidneys were the seat of an acute parenchymatous nephritis and some amyloid change. The intestine was normal. The mesenteric and retroperitoneal lymph nodes were enlarged and caseous. The liver weighed six pounds, and was smooth and hard.

Stated Meeting, December 22, 1897.

WARREN COLEMAN, M.D., VICE-PRESIDENT, in the Chair.

MALFORMATION OF THE HEART.

Dr. HARLOW BROOKS presented a heart that been removed post-mortem from a married woman, thirty-nine years of age. She had been a heavy drinker, and gave a history of rheumatism, but not of syphilis. Her last illness began last August with shortness of breath on going up and down stairs, and œdema of the lower extremities toward evening. At the time of entering the hospital there was general œdema, and she complained of palpitation of the heart. She died two days later, the temperature during her stay having ranged between 97° and 100° F. It was noted at the autopsy that the face was much congested, and the ankles œdematous. The pleural cavity contained 1.5 litres of very clear serous fluid. The pericardial sac was greatly dilated, and occupied the entire anterior and left mediastinal spaces. The heart was enormously enlarged and its chambers contracted. The muscular walls were compara-

tively thin, and the muscle itself was soft and somewhat œdematous. The cavities contained a considerable quantity of post-mortem clot. The conus arteriosus was dilated, and its walls showed diffuse areas of arterial sclerosis. The coronary arteries were the seat of extensive atheromatous disease. At the base of the conus a foramen was found, measuring 1.5 ctm. It was bisected by a column of tissue, one millimetre in diameter. The edges were smooth and rounded, and it led into a sac which bulged into the right auricle. This sac was spherical, and both the external and internal walls were smooth and free from calcareous deposit. It measured 3 ctm. in diameter. The mitral segments were markedly retracted. There were similar lesions in the right side of the heart, which was decidedly dilated. The heart weighed twenty-eight ounces. The liver was congested and of the nutmeg type, and the kidneys were also congested. So far, no microscopical preparations had been made of the wall of the sac. He had not seen or heard of a similar specimen, but was inclined to look upon the condition as congenital. Possibly it was an aneurism.

Dr. ROWLAND G. FREEMAN said that the specimen did not admit of any very positive expression of opinion, yet it seemed to him to present the appearance of an aneurism, in spite of the fact that there was no evidence of disease of the surrounding wall.

Dr. BROOKS said that the existence of the small band of tissue had led him to the conclusion that the formation was probably a congenital one.

Anniversary Meeting, January 12, 1898.

WARREN COLEMAN, M.D., VICE-PRESIDENT, in the Chair.

TWO CASES OF ABSCESS OF THE LIVER.

Dr. HARLOW BROOKS presented a specimen from a case of abscess of the liver. It was removed from a woman, fifty-six years of age, a cook by occupation. She was admitted

to Bellevue Hospital on July 15, 1897. She was of intemperate habits, but had had good health previously. Three weeks before admission she became overheated, and then began to have nausea and vomiting, and pain in the abdomen. This was followed by a series of chills, with elevation of temperature. Examination showed the patient to be poorly nourished. Over both lungs posteriorly breathing was high pitched, probably because of the thin chest-wall. The liver was slightly enlarged, and its free border was firm and sharp. The spleen appeared to be normal. The temperature range was somewhat like that of typhoid fever, but the Widal reaction gave a negative result. There was some leucocytosis present. The patient died after having been in the hospital about one month. No diagnosis had been made. On autopsy, the lungs were found to be emphysematous, and there were several cicatrices in the apices, evidently tuberculous. The inferior surface of the right lobe of the liver was firmly adherent to the subjacent tissues, and on separating the adhesions, a large quantity of greenish-yellow pus escaped from the lower surface of the liver. The right lobe of the liver was found to be completely riddled with large abscesses, which were limited by firm walls of dense connective tissue. The cavities were lined with granulations, apparently not tuberculous. The lower wall was formed by dense peritoneal adhesions. A pin, encased in calcareous matter, was dislodged from the wall of the main abscess cavity. It was a pin of ordinary length and appearance, except, that owing to the calcareous deposit, it measured 3 mm. in diameter. The liver, after removal, weighed two pounds and ten ounces. The gall-bladder was small, and contained a small quantity of light yellow mucoid secretion. The lesser curvature of the stomach was involved in the adhesions already referred to. Ten centimetres from the œsophageal opening the mucous membrane presented an old circular cicatrix, 15 mm. in diameter, surrounded by a ring of indurated tissue. There was no evidence of recent inflammation. The base of the cicatrix was very thin, and

it was evident that at one time there had been perforation of all the coats of the stomach. This ulceration was directly below the centre of that portion of the liver containing the abscess cavity. In other respects the autopsy was negative.

This was the only case he had been able to find, in which a pin had been found in the liver of a human being. He had found three cases in which foreign substances had been known to enter the liver of lower animals through the stomach, giving rise to liver abscess.

The second case was that of an Italian mechanic, thirty-seven years of age. He had had no previous illness, and denied syphilis. Three months previously he began to cough, lose flesh, and have night-sweats, and this had been followed by emaciation and rapidly failing strength. He had also had pain in the right side of the chest for some time past. The expectoration was muco-purulent, and was said to have been bloody at first. Examination showed him to be poorly nourished, and slightly anæmic. Over the lower half of the left side of the chest posteriorly there was marked dulness and diminished vocal fremitus. There was also dulness over the right apex, and the breathing and voice were slightly bronchial. The apex beat of the heart was normal, and the pulse was soft and regular. There was a systolic murmur over the aortic area, transmitted down the sternum. The liver and spleen were apparently normal. On introducing a needle in the eighth intercostal space on the right side posteriorly, two drachms of thick purulent fluid were removed, and then a clinical diagnosis was made of empyema. The bacteriological examination showed this fluid to be sterile, and to be free from tubercle bacilli. On December 10th, an incision was made in the eighth intercostal space, under cocain anæsthesia, but on introducing a trocar into the pleural cavity no fluid was withdrawn. The lung retracted immediately on opening the chest. On December 13th, pus was drawn from the chest, but was found to be sterile. The man was then etherized and the wound en-

larged to three or four inches in length. A portion of the eighth rib was also removed, but no pus was found. A drainage tube was inserted. On December 14th, the dressings were saturated with sero-sanguineous fluid, but there was no pus present. The body temperature was 103° F., and the man complained of pain. Examination of the blood showed the hæmoglobin to be sixty per cent. Three days later, the patient felt more comfortable and the temperature was only 100° or 101°. A long, sterile rubber catheter was introduced deeply into the pleural cavity, but no adhesions were found. Two drachms of slightly turbid serum followed the withdrawal of the catheter. A week later, it was noted that the discharge was distinctly purulent, and on introducing the catheter, six or eight drachms of pus were evacuated. The patient died that evening.

The autopsy showed an abscess cavity, 6 ctm. in diameter, located over the right middle lobe and surrounded by uninvolved pleura. Posterior to this was another area in which the pleural sac was covered by a purulent effusion to the depth of two or three millimetres. The cavity contained about 30 cc. of purulent fluid. The capillaries of the left pleura were injected, but there was no septic infection. The condition of the pericardial sac was negative, except that it contained 15 cc. of clear fluid. The right ventricle contained a small quantity of ante-mortem clot. The aortic and mitral segments were slightly thickened; the valves of the right heart were normal; the coronary arteries showed a few sclerotic patches. The heart weighed nine ounces. The tissue of the right lung was collapsed, firm, and congested, and the top of the lower lobe was the seat of a broncho-pneumonia. The left lung was much congested. The branches of the pulmonary artery were distended with post-mortem clot. The surgical incision entered the right pleural cavity. The liver was large, and its capsule was smooth. The left lobe was divided so as to form a supernumerary lobe. The lower portion of the right lobe was the seat of a large abscess. This abscess cavity was lined

with a thick pyogenic membrane, and contained thick, odor-less pus, of a light chocolate color. There was no evidence of perforation, or of remaining liver tissue. The gall-bladder contained 15 cc. of dark green mucilaginous bile. There were no peritoneal adhesions. The mucous membrane of the stomach was slightly congested. There was evidence of a small ulcer, one centimetre in diameter, situated on the posterior inferior aspect, near the pylorus. It was com-pletely healed over, and apparently had never perforated below the submucosa. No lesion of the external wall could be found, and the ulcer probably bore no relation to the liver abscess. In other respects the autopsy was practically negative. The microscopical examination of the abscess wall showed old interstitial connective tissue, covered with granulations which were not tuberculous in character. Dr. Brooks thought it probable that at the time of the former ulceration an embolus had been swept into the portal vein, and had lodged in that portion of the liver in which the abscess was found.

Dr. W. G. LE BOUTILLIER said regarding the second case, that he felt somewhat differently now about the diagnosis from what he had at the time of its occurrence. It would seem at first to be rather easy to differentiate suppurations of the pleura from those of the liver, especially with the aid of bacteriology ; nevertheless it was impossible in certain cases. Abscesses of the liver had been known to be sterile, or to contain pyogenic germs, and even the pneumococcus. If the typhoid bacillus or the colon bacillus were found in the pleural cavity, one would at once recognize that the em-pyema was not an ordinary one. In recent discussions regarding the treatment of empyema, a distinction had been made abroad, which did not appear to have been made in this country,—namely, that an empyema caused by the pneumococcus might be treated by aspiration with a good probability of recovery without further interference, while other empyemata require free incision.

Dr. GEORGE P. BIGGS asked Dr. Brooks whether lesions

of the alimentary canal, particularly of the colon, had been excluded.

Dr. BROOKS replied that this had been done, not only by gross, but by microscopical examination.   A careful search had also been made for the colon amœba, but with negative result.   In the walls of the abscess there had been a few micrococci and some bacilli, apparently colon bacilli.   It should be understood that the pus from the abscess cavity was itself sterile.   An amœbic abscess, he thought, could be positively excluded in this case.

CIRRHOSIS OF THE LIVER IN A CHILD.

Dr. ROWLAND G. FREEMAN presented the following report : A Syrian boy, ten years old, had been admitted to St. Mary's Hospital on September 10th, and had died on December 18th.   There was a history of measles and whooping-cough some time before admission.   Ten months previously there had been some illness, with fever and pain, but no further details could be obtained.   One month before admission the child had developed œdema of the feet and dyspnœa, and the urine had become scanty.   There had been no chills.   On admission, he was jaundiced ; the tongue was heavily coated and moist ; the urine had a specific gravity of 1022, and was free from albumen and casts. There was marked enlargement of the abdomen, dulness on percussion, and an impulse.   The liver was enlarged to three inches below the free border of the ribs.   It was firm to the touch, and its upper border was at the fifth space.   The spleen was markedly enlarged.   The examination of the heart and lungs was negative.   On September 17th he passed some tape-worm.   On October 14th the urine contained a trace of albumen, and he then developed considererable ascites.   Early in November a gallon of clear fluid was evacuated, and was tapped repeatedly after that.   Examination of the blood on November 19th showed 60 per cent. of hæmoglobin and slight leucocytosis.   He was finally transferred to the surgical ward, and died a few days later.

The autopsy was made nine hours after death.   The body was greatly emaciated. The abdomen contained ten ounces of slightly turbid fluid.   There was general peritonitis, with fibrinous exudate and many loose adhesions.   The lungs showed chronic congestion.   One bronchial lymph node, half an inch in diameter, was found to be cheesy and tuberculous.   This was the only evidence of tuberculosis in the body.   The anterior mediastinal lymph nodes were enlarged, but showed nothing except cellular hyperplasia.   The liver was large, bound down by adhesions and pushed upward by the distension of the intestine.   It was pale and very hard, and its cut surface was of a light color.   The fibrous tissue about the vessels was very distinct.   There were purple areas, about the size of a pin's head, on the cut surface. The spleen showed perispleenitis.   It extended to the nipple line and to the free border of the ribs.   The organ was pale and rather hard.   The capsules of the kidneys were adherent, and the markings were indistinct.   The adrenals were nornormal.   The pancreas was hard.   In the colon, about twelve inches above the anus, was a polypoid growth.   On microscopical examination of the liver, there was evidence of marked cirrhosis, with hypertrophy of the bile ducts, and very considerable increase in the interlobular connective tissue.   The pancreas showed the so-called lymphoid nodules.   The kidneys showed parenchymatous nephritis.   The polypoid growth in the colon contained tubules lined with cylindrical epithelium.

Dr. Freeman said that cirrhosis of the liver was rare in childhood, and still rarer in infancy.   It occurs in children mostly between the ages of nine and fifteen years.   A case had been described by Oliver in an infant three months old, and Northrup had reported in 1883 a case in a child four and a half months old.   Of 130 cases collected by Hatfield, 32 were alcoholic.   In the present case there was no history of alcoholism or syphilis.   In 65 cases collected by Howard, 15 per cent. were alcoholic ; in 11 per cent. there was a history of syphilis, and in 11 per cent. a history of tubercu-

losis. In some of the cases there had been preceding eruptive fevers, and in a few instances it had been thought that malaria was an etiological factor.

Under the microscope, sections of the liver were exhibited, and also a section of the pancreas showing the lymphoid nodules.

Dr. E. HODENPYL said that he had seen several sections from this case of cirrhosis of the liver. It seemed to him there was in the liver a very marked reproduction of the bile ducts, or rather a marked new formation of the bile ducts, and that the production of fibrous tissue was relatively enormous for the liver of such a young child. In addition to the ordinary lesions of cirrhosis there were certainly present very well-marked hyperplastic lymph nodules, not only in the liver, but also in the pancreas. In the latter they were rather numerous and quite distinct. From the history he was of the opinion that there might have been an acute infectious disease as the starting-point; probably the cirrhosis was only one of the expressions of an acute infection. These nodules have been found repeatedly in many of the acute infectious diseases, notably typhoid fever. Possibly the cirrhotic process instead of being a chronic interstitial hepatitis was really a replacement fibrosis, due to auto-intoxication with necrosis of the cells, and their replacement by new fibrous tissue.

Dr. JAMES EWING said that he did not see the evidence on which was based the opinion that these small round cells were lymph nodules; they looked to him more like the ordinary mononuclear cells associated with chronic inflammation.

Dr. HODENPYL said that the nodules to which he had special reference were sharply circumscribed, and were best seen in the pancreas. They were composed strictly of mononuclear cells, and were certainly not leucocytes. Between the cells was a fine, delicate reticulum. This was an organized tissue in that it contained blood-vessels which traversed these small nodules.

Dr. FREEMAN thought the nodules in the pancreas answered fairly well to the ordinary description of the lymphoid nodules occurring in typhoid fever, and sometimes in the liver.

Dr. EWING believed that these lymph nodules were found most abundantly in the capsule of the liver, and that they were also sometimes seen in abundance throughout the section of the lobe in the livers of infants. He did not know that they were recognized as accompanying the lesions of such a cirrhosis as was present in this case.

Dr. GEORGE P. BIGGS asked if there was any evidence to show that these lymph nodules, occurring in infectious diseases, and particularly in typhoid fever, persisted for a long time, and if they had anything to do with the development of cirrhosis.

Dr. HODENPYL said he did not think any one knew how long they persisted. As a matter of fact these nodules were in the capsule of Glisson.

A CASE SHOWING THE BOTHRIOCEPHALUS LATUS.

Dr. JAMES EWING reported a case of bothriocephalus latus, and exhibited the worm. The specimen had been taken from a Finlander, who had been for eighteen years in this country continuously. In his childhood, he had been accustomed, with the rest of his people, to eat freely of raw fish. The man had evidently harbored the parasites for at least eighteen years. About the time of leaving Finland, he had passed certain worms said to be the ordinary tapeworms. There had been no further symptoms until a month or two ago, when he had passed a considerable mass of these worms. Another interesting feature was that he had harbored four of the worms, for, although no heads had been found, there must have been four worms present, as there were four portions—two to three feet long—in which a neck of very small dimensions was discovered. A third point of interest was the fact that in spite of these four worms he had enjoyed good health, with the exception of

occasional abdominal pain. He was entirely without anæmia or any other constitutional disturbance. The worms themselves were of interest in that it was believed that this worm was rare in this country. Very few such cases had been reported. Dr. Ewing said that about one month ago he had examined a collection of 300 specimens of so-called tape-worm, used by a quack for advertising purposes. Out of this large number, all but three were the ordinary tænia; two seemed to show the broad, thick segments of tænia solium, and one was unquestionably the bothriocephalus latus. The first mentioned, or ordinary tape-worn, is 2 ctm. long and 1 to 1.5 ctm. broad, and very much longer than the tænia solium. The latter measures 1 to 2 ctm. in breadth, and not much more than 1 ctm. in length. The segment of the bothriocephalus is about 4 to 5 times as broad as it is long. Another point of distinction is the presence of the pigmented uterus. The eggs of this specimen are very abundant, and have a characteristic form. They show a rather delicate, deeply outlined membrane, and large globules of protoplasm of immature embryo, thus differing entirely from the eggs of the tænia solium and of the ordinary tape-worm.

OXYURIS VERMICULARIS.

Dr. H. HEIMAN said that in order to bring out the points of difference between these various parasites he would place under the microscope a specimen very frequently found in children—the oxyuris vermicularis. The specimen was interesting because the entire worm was present. Eggs, almost by the thousand, were to be seen in the interior of the worm and outside of it. It was differentiated readily by the small size of the eggs and their peculiar capsule.

Dr. LE BOUTILLIER asked if the diagnosis of oxyuris vermicularis could be made constantly by microscopical examination of the fæces—in other words, were the eggs constantly present in the fæces, or must one look for the worm itself.

Dr. HEIMAN replied that the diagnosis could be made by simply finding the eggs in the fæces. It was known that the worm could be recognized simply by the presence of the ova in the fæces, as they were entirely different from the eggs of the other common parasites inhabiting the alimentary canal.

HEART MUSCLE OF HORSE AND DIPHTHERIA ANTITOXIN— METHOD OF STAINING.

Dr. GEORGE P. BIGGS presented a microscopical preparation of heart muscle, removed from a horse that had been used for the production of diphtheria antitoxin. The specimen had been hardened and stained by Marchi's method, and showed the extreme fatty degeneration in a remarkably clear way. The method consists in hardening in Müller's fluid for about one week; then in two parts of Müller's fluid and one part of osmic acid for another week. The specimen is then gradually dehydrated with decreasing strengths of alcohol, embedded, and cut into sections. No further staining is needed, although a carmine stain may be employed. The osmic acid staining of the fat globules was very well shown in the specimen presented, and it made a permanent one for purposes of demonstration. The specimen was mounted in balsam. In the specimen exhibited the degree of fatty degeneration was extreme. In the case of this horse, the injections of diphtheria toxin had been pushed rather rapidly, and death had resulted in ten days from sudden heart failure.

Dr. GEORGE C. FREEBORN said that, according to his experience, osmic acid preparations mounted in balsam all fade after a time. Glycerine is the best permanent mounting for all osmic acid preparations.

Dr. BIGGS said that the specimen had been mounted only about six weeks, but had apparently not yet undergone any change.

Dr. IRA VAN GIESON said that the application of this method of staining seemed to him of great importance.

The ordinary method of immersing in fresh osmic acid prevented any great penetration. Moreover, the whole procedure of Marchi was very convenient. Hamilton, in a recent number of *Brain*, had reported that the reaction could be obtained by taking specimens of the nervous system, carrying them through alcohol, and soaking them in Müller's fluid, in which a brain had been immersed for some time. The fluid evidently extracted something from the brain necessary to produce this reaction. This modification of the process was very convenient, as by the other process the specimens were apt to become brittle. The whole reaction was very complicated. It did not seem to be the same sort of reaction that was observed with fresh fat when put in osmic acid solution alone.

Dr. H. BROOKS remarked that he had some specimens of fatty kidney, stained eight years ago with osmic acid and mounted in balsam, which were apparently as clear and bright now as when originally made.

SARCOMA OF THE EYE IN A CHILD.

Dr. W. B. NOYES presented a microscopical specimen of a small, round-cell sarcoma growing from the hyaline membrane which lines the posterior surface of the crystalline lens. It had been taken from the eye of a child. There was also a secondary deposit around the margin of the choroid coat of the eye.

Stated Meeting, January 26, 1898.

T. MITCHELL PRUDDEN, M.D., PRESIDENT.

A MODIFICATION OF CULLEN'S METHOD OF PREPARING FRESH SECTIONS FOR MICROSCOPIC WORK.

Dr. EUGENE HODENPYL read this paper. He said :

" It is frequently desirable at surgical operations, at autopsies, or in general laboratory work to obtain quickly stained sections for diagnostic purposes. Fresh unstained sections,

while they are valuable for the study of certain lesions, are open to so many serious objections that they cannot be made use of for the purposes indicated. Moreover, fresh sections cannot be satisfactorily stained unless they have been previously fixed or hardened by some preservative. Of the various hardening-agents which have been tried for rapid fixation of frozen sections, none had been found successful until Cullen (' Beschleunigtes Verfahren zur Färbung frischer Gewebe mittelst Formalins,' *Centralblatt für allgemeine Pathologie*, 1895, Bd. No. 11, pp. 448-450; also *Johns Hopkins Hospital Bulletin*, April, 1895, and May, 1897) suggested the use of formalin either before or after cutting, as a partial fixative, when fairly successful results were obtained.

" A serious objection to the use of this method I have found to be the shrinkage and consequent distortion which always occur to a greater or less extent. At times so great a shrinkage took place in my sections that they were entirely useless. At Dr. Prudden's suggestion, I have devised a scheme of fixing sections on cover glasses by means of albumen. This may be accomplished by impregnating sections with a solution of egg albumen, floating them on cover glasses, and finally coagulating the albumen. By this means shrinkage and distortion, which would otherwise occur from the subsequent action of alcohol, may be largely if not entirely prevented.

" This modification does not materially increase the time required to prepare stained fresh sections for the microscope. I have repeatedly cut sections of fresh tissues, fixed them on cover glasses, and have hardened, stained, and mounted them in as short a time as nine minutes. Furthermore, it permits the use of hardening-agents other than formalin. Fair results have been obtained with osmic acid, mercuric chloride, etc. For purposes already indicated this modified method seems to be a valuable one, since it enables one to determine the nature of new growths, or the lesions of viscera, etc., within a few minutes—a procedure which would otherwise require hours or days to accomplish by the ordin-

ary hardening and impregnating methods. Cullen's method, as may be imagined, is not applicable for all tissues. The results obtained by the suggested modification have been entirely satisfactory for diagnostic work, but for fine structural details other methods are still to be preferred.

" The technique of the method is as follows :

" 1. Almost any form of freezing-microtome may be used. The freezing-agent may be ether, carbonic acid, or rhigolene.

" 2. Sections may be cut from perfectly fresh material, but more satisfactory and better results are obtained from material which has previously been hardened one or two hours or longer in a ten-per-cent. formalin solution. (It is convenient to drop bits of tissue into ten-per-cent. formalin at the time of the operation or during the post-mortem examination. By the time they reach the laboratory they are usually sufficiently impregnated to be cut and stained.)

" 3. Tissues already hardened in formalin should be soaked in water a minute or two to remove the formalin before cutting.

" 4. Sections as they are cut may be dropped directly into the albumen solution, where they remain until needed. A solution of albumen which has been found to answer the purpose is prepared by adding to 50 c.c. by volume of egg albumen 150 c.c. of distilled water and sufficient of a solution (usually about 50 c.c.) of salicylic acid (saturated), which has been rendered slightly alkaline with lithium carbonate, completely to dissolve the albumen. The solution may be kept unchanged several weeks by adding a little gum camphor.

" 5. Unhardened sections should be placed in a five-percent. formalin solution three or five minutes, after which they are soaked in the albumen solution two or three minutes.

" 6. Float sections on cover glasses. Remove excess of fluid with filter paper when necessary. Blot sections evenly, taking care not to use pressure enough to cause them to bear the imprint of the cloth. (The best blotting-material seems to be washed cheesecloth used in several layers. The

use of filter paper, towels, muslin handkerchiefs, etc., for this
purpose has not been satisfactory.)

" 7. Transfer immediately to alcohol, alcohol and ether
(equal parts), osmic acid, or mercuric chloride, etc., in order
to coagulate the albumen and to fix the section and com-
plete the hardening.

" 8. Sections may be stained on the cover slip in various
ways. For ordinary diagnostic work staining with hæma-
toxylin and eosin and mounting in balsam answer well.

" 9. Stain from two to five minutes in hæmatoxylin (Del-
afield's or Gage's).

" 10. Decolorize by passing rapidly through acid alcohol
—hydric chloride, 1 part ; eighty-per-cent. alcohol, 99 parts.

" 11.   Wash thoroughly in water.

" 12.   Dehydrate and stain in eosin alcohol. (Eosin which
has been precipitated from a saturated aqueous solution by
acid stains connective tissue more sharply and gives better
results than ordinary eosin.   It is prepared by Fischer by
adding to a saturated aqueous solution of eosin hydric chlo-
ride in excess.   Filter and wash the precipitate with water
until the acid is removed.   Dry the precipitate and dissolve
in alcohol.)

" 13.   Clean in oil of origanum, oil of cloves, creosote,
or zylol, etc.

" 14.   Mount in balsam after having cleaned the upper
surface of the cover slip."

Dr. J. S. THACHER said that it was exceedingly important
to keep fresh sections from shrinking, and this method of Dr.
Hodenpyl seemed to obviate the difficulty better than any
other with which he was acquainted.   Sometimes by fixing
the edges of the cut sections they could be prepared quite
successfully.

Dr. GEORGE P. BIGGS said that when a hurried examina-
tion of a tumor was required, as during an operation, he had
usually been able to make a diagnosis by staining with a
watery solution of methylene blue without hardening.   Of
course, it was a crude process, but it had served the purpose.

The PRESIDENT also spoke of the great utility of Cullen's method, as modified by Dr. Hodenpyl.

Dr. HODENPYL exhibited to the Society a freezing microtome and a number of specimens of various organs for examination. Those fixed in alcohol, he said, were better than those hardened in alcohol and ether.

A REPORT ON FOUR CASES—RUPTURE OF THE UTERUS, LEUKÆMIA, HEMORRHAGIC PANCREATITIS, AND GASEOUS EMPHYSEMA—FROM WHICH THE BACILLUS AËROGENES WAS ISOLATED IN CULTURE.

Dr. CHARLES NORRIS presented this report.

CASE I.—The patient, a multipara, was admitted to hospital at 8 P.M. on November 16, 1896. She stated that there had been a sudden discharge of about one pint of blood from the vagina on October 26th, but no further bleeding until November 8th. Since the latter date there had been slight hemorrhage every day. She had nearly reached the full term of pregnancy. As she was in poor condition, podalic version was performed. The patient at once went into a condition of shock, but no rupture of the uterus was made out and the organ was found to be well contracted. Death occurred five hours after delivery, apparently as a result of the shock induced by rapid extraction, as the quantity of blood lost was not more than thirty or thirty-two ounces. The autopsy was made by Dr. Ewing, twenty-four hours after death. The woman was large and fat, and distinctly anæmic. There was no œdema. The right broad ligament and the tissues of the right pelvic region, around the kidney, in the mesocolon, and over a considerable area of the mesentery, were very emphysematous and infiltrated with freshly clotted blood. The peritoneal surfaces were intact. There was a large, irregular laceration involving the entire right portion of the os, and extending from one inch to one inch and a half above the internal os, completely through the uterine wall and into the tissues of the broad ligament. Below it extended one inch into the vagina. The

tissues of the uterus were flabby, but otherwise normal. The lungs were congested and œdematous. The heart chambers were empty and flaccid. Minute air bubbles were found beneath the endocardium. The spleen was extremely flabby and emphysematous. The liver was soft and pale, and its surface dotted with larger and smaller air vesicles. The interior vena cava and hepatic veins were distended with frothy fluid. The kidneys were flabby, the surface smooth, and the capsule free. A few medium-sized air bubbles were present. The blood which exuded from the veins at the site of the saline infusion contained no gas. There was a marked diminution in the quantity of blood in the body. The anatomical diagnosis was rupture of the uterus, acute anæmia, and pulmonary œdema.

Cover-glass preparations from the organs showed large bacilli, with capsules staining by Welch's method. They retained the stain by Gram's method, and were non-motile. Pure cultures were obtained from the liver, spleen, and uterus. A rabbit was given intravenous injections of a pure culture, and then killed after a few minutes. It was next placed in the thermostat at 37° C. for twenty-two hours. At the end of this time there was extensive emphysema of the body and of all the organs. A guinea-pig, inoculated with one cubic centimetre of bouillon in which a bit of the liver had been squeezed died in four days, with a gaseous phlegmon.

In this case, the speaker said, the portal of entry seemed undoubtedly to have been the uterus. There was a rupture of the uterus, through which the bacilli could readily have obtained a foothold in the tissues during life. They need not have been introduced during the childbirth or version, but might have found the bleeding uterine cavity a suitable soil for growth, or at least existence, before childbirth. Dead tissues, such as blood clots, were an especially favorable medium for the growth of this bacillus. The presence of gas at the autopsy was especially marked around the uterus and in the mesentery and inferior vena cava, and less marked

in the liver. This fact, and the delay in making the autopsy —twenty-four hours—pointed to a post-mortem invasion, and not to an entrance into the circulation during the death agony or before. Absence of more widely distributed emphysema, as in the subcutaneous tissues and the appearances of the liver sections, confirmed this view. Around the masses of bacilli the liver cells were not degenerated, and their nuclei stained well. Around the gas blebs there were no changes except those due to pressure.

CASE II.—In this case the previous personal history was negative. For the past three months there had been pains in the joints of the upper and lower extremities, slight fever, nausea, vomiting, and constipation. When the patient was admitted to Dr. Delafield's service in the Roosevelt Hospital on December 17th, the nutrition was fair and the pulse rapid but of good force. The right knee was a little swollen and tender. The temperature was 100° F.; pulse, 100; respirations, 26. The urine was negative except for a trace of albumin. In the third left interspace, near the edge of the sternum, there was a harsh systolic murmur and a roughening of the first sound of the heart. The examination of the liver and spleen was negative. On January 4th the patient had a chill and a morning temperature of 105° F. During the week the temperature ranged between 101° and 103° F., and signs of consolidation over the left lung were present. On January 8th, after an examination of the blood, Dr. Ewing reported the case to be one of spleno-myelogenous leukæmia, the leucocytes outnumbering the red blood cells. Death occurred on January 10th. At the post-mortem examination, made twenty-four hours after death, it was found that the subcutaneous tissues over trunk and extremities crepitated, and the abdominal cavity was filled with gas which when ignited burned with a blue flame. The mesenteric veins and the vena cava were distended by gas. There were no signs of peritonitis, but there was a little bloody serum in the peritoneal cavity. In both lungs there were areas of broncho-pneumonia. The spleen weighed twenty-

six ounces and was emphysematous, and the follicles were much enlarged. There was evidence of a recent perisplenitis. The liver weighed four and one-half pounds, and its cut surface was of a dark slate color and very emphysematous. The kidneys were enlarged and emphysematous; the capsule was not adherent; the surface was smooth and mottled with petechiæ. The pelvic mucosa was infiltrated with blood. The pancreas appeared to be much decomposed. There were petechial spots in the mucosa of the stomach. The inguinal, cervical, and axillary glands were enlarged and deeply pigmented. The marrow of the shaft of the femur was partly fatty and reddish in color. The brain was very anæmic, and there were a few hemorrhages in the pia mater. The ribs were very fragile, and their marrow consisted of a waxy, homogeneous substance, no red marrow being present. The lingual tonsils were a little enlarged and deeply pigmented. The anatomical diagnosis was acute leukæmia and hyperplastic splenitis.

Cultures were made from the liver and from the contents of the small intestine. Pure cultures were obtained from both places. A smear made from the contents of the intestine revealed the gas bacillus in enormous numbers. On the aërobic plates from the liver numerous colonies of the staphylococcus pyogenes aureus developed. The aërobic plates of the intestine developed the staphylococcus and the colon bacillus. The pure cultures of the gas bacillus produced gaseous phlegmons in guinea-pigs, and intravenous inoculations in rabbits killed shortly after inoculation produced marked emphysema of all the tissues and organs. Intravenous injection into rabbits of the hemorrhagic fluid contained in the gaseous phlegmons of guinea-pigs produced death, in one rabbit in four hours, and in a second rabbit inside of twenty-four hours. Examination of the sections of the spleen showed loss of nuclear staining in the cells situated around the gas blebs, and diffuse protoplasmic staining. The liver showed areas of loss of nuclear staining around many of the masses of bacilli. In the kidney the

same appearances were present around the gas blebs as in the spleen and liver. There were likewise present areas of necrosis around many of the bacterial emboli, such as were present in the liver.

These signs of a vital reaction in the tissues before death, the general distribution of the bacilli in the body, as evidenced by gas formation, the fact of the body being kept before the section in a cold room, and the marked tympanites and tenderness of the abdomen, especially marked several days before death, all pointed to an invasion of the gas bacillus during life. It was significant that several days before and up to the death of the patient the diagnosis of peritonitis was considered probable.

CASE III.—The third case was that of a patient admitted to Dr. Norris's service at St. Luke's Hospital, on February 6, 1897. He was markedly alcoholic. Three days before admission he had begun to vomit large quantities of dark, clear, and clotted blood, and to pass blood in the stools. Soon after admission he grew weaker, became delirious, and died with œdema of the lungs. The autopsy was made by Dr. Norris, twenty-four hours after death. All the subcutaneous tissues were tremendously inflated with a gas which burned with a bluish flame. A foul odor was present. A number of discolored blebs filled with serum were situated on the thighs and trunk. The face was much swollen and discolored, and gas and blood bubbled out of the mouth. The scrotum was also much swollen by gas. The heart was dilated, and weighed sixteen and one-half ounces. There was much post-mortem softening in all the organs. The liver weighed six and one-fourth pounds, and its surface was rough. All the organs were emphysematous.

Anaërobic plates made from the liver and the contents of the small intestine developed colonies of the bacillus aërogenes capsulatus, which were isolated in pure culture. From the aërobic liver plates was isolated a streptococcus which clouded bouillon. From the aërobic intestinal plates the same streptococcus and the colon bacillus were isolated.

The gas bacillus from this case likewise produced gaseous phlegmons in guinea-pigs, and marked emphysema of all the organs and tissues of rabbits injected just before death. Intravenous injections of the hemorrhagic fluid from gaseous phlegmons likewise produced death in rabbits. Working with the dead bacilli, no results were obtained. A filtered sugar bouillon culture, grown for two weeks anaërobically, was employed to test the effect of the toxins produced by the gas bacillus in artificial culture. Intravenous injections in rabbits (eight cubic centimetres in one, and twelve cubic centimetres in a second rabbit) produced only a slight disturbance. In guinea-pigs a marked fall of temperature and toxic disturbance were noted. In one pig six cubic centimetres, subcutaneously injected, produced in one hour a fall of temperature from 101.2° to 96.8° F. The hair of the neck and shoulders stood erect; the abdomen was tender to the touch at the site of injection, and the animal lay down on its side and stroked its mouth with its paws. There was slight trembling three hours after the injection, and the temperature was 100° F. In twenty hours the animal had recovered. A second pig received twelve cubic centimetres of the filtered toxin intraperitoneally. One hour after the injection the temperature fell from 101.8° to 95.4° F., and the animal was weak, trembling, and lying on its side. In three hours the temperature was 96.8° F., and the animal trembled violently, but it had entirely recovered at the end of twenty hours.

CASE IV.—The fourth case was one of gaseous phlegmon, developing after a compound fracture of the femur. The same bacillus was isolated from this case, during the life of the patient, cultures being made at the bedside.

Dr. W. G. LE BOUTILLIER, in discussing this report presented by Dr. Norris, said that he would like to report the case of a man who had been admitted to hospital complaining of chilliness. He had an aneurism of the left femoral artery, about the size of an egg. Six days after admission he became delirious, and the temperature reached 102° F. On

June 5th the respirations were between 22 and 36, and the temperature was 105° F., and he suffered pain in the region of the aneurism. The latter was found to have increased enormously in size ; the skin was tense and swollen, and there was some ecchymosis around the knee.   On June 7th a ligature was placed around the femoral artery, with the intention of operating upon the aneurism and removing the clot.   When a portion of the clot had been turned out, there was such a rush of dark blood that the only thing that could be done was to pack the large wound and return the patient to the ward.   The next day the dressing was saturated with a foul-smelling discharge.   Two days later the temperature was again high.   The following morning the man began bleeding, and the morning after that gas and serum were forced out of the wound.   The bacillus capsulatus was found to be present, but no cocci were found.

Dr. Le Boutillier also reported briefly two other cases.   A colored man, who had received an injury to the arm in the region of the elbow, developed after a few days a small lesion near the elbow, and the arm became greatly swollen. Large quantities of serum and foul-smelling gas were discharged.   No cultures were made, but smear preparations showed a very large bacillus.   The other case was one of gaseous abscess of the scrotum and perineum, with a small necrosed area in the centre.   On the incision pus was evacuated, but no bacilli were found in the cultures.

Dr. HARLOW BROOKS said it had been his good fortune to see autopsies on four cases—three at Bellevue and one at Charity Hospital.   Dr. J. G. Adami had reported two cases in which there had seemed to be pure infection—one from the tonsil and the other from passing a sound.   He thought the cases were quite common.

Dr. JAMES EWING said this subject had been brought before the Society two years ago, and since then it had proved an interesting study to some of the members.   The leukæmic case reported by Dr. Norris was one of special interest.   It was unfortunate that often there was no clinical

history to aid in determining whether it was a case of ante-mortem infection or not. He believed that rapid putrefaction in such a case would indicate an ante-mortem infection, and that in cases of infection occurring after death the progress was slower and the bacilli were found more in the area of infection, and were not spread through the body as in the other class of cases. He was very desirous of learning what relation the bacillus capsulatus bore to the streptococci and other cocci. It was at least suggestive that infection with the bacillus capsulatus was often associated with ruptures of the uterus, of blood-vessels, or with the occurrences of profuse hemorrhage.

A PRIMARY CARCINOMA OF THE KIDNEY.

Dr. HARLOW BROOKS reported this case. He said:

"The patient was a maiden, forty-eight years old. She was born in Ireland, but the greater part of her life had been spent in America, in the occupation of maid. She was always anæmic in appearance, and a peculiar tremor of the head had been present for several years, for at least over ten years. Her general health, however, appears to have been good. In March, 1897, she is said to have had pneumonia, and she stated that at this time she had undergone an operation for pus in the lung. In September, 1897, she entered Trinity Hospital, to be treated for an injury of the thigh, and was shortly after seen by the attending surgeon, Dr. Nelson H. Henry, who made the usual surgical examinations of the injured extremity. Nothing peculiar in regard to her case was noted either before by the nurse, or at the time of the examination, though a general physical examination was not made at this time, as the patient made no complaint other than of the injury. A few moments after leaving the ward Dr. Henry was recalled and found the patient pulseless and cyanosed. Froth was exuding from the mouth. Artificial respiration and the usual stimulants were applied, with no apparent effect, and in a few minutes the patient was found to be dead.

"The autopsy was performed on the same day, while the body was still warm.   I shall omit in this report all the details of the autopsy, touching only on those points which seem most noteworthy.   Suffice it to say that extensive embolism of the left pulmonary artery was found, and its origin sufficiently accounted for by an endocarditis of considerable extent and apparently of quite recent origin ; possibly this was a resultant of the previously existing pneumonia, abundant traces of which still persisted, together with a thickened pleura.

"The brain was poorly formed, showing considerable asymmetry in its contour.   The convolutions were flat-tened, small, and irregular.   A few convolutions showed a gelatinous degeneration of their substance.   These changes no doubt account for the long-standing tremor and for the simple and child-like appearance of the face, as well as for the lack of feminine type in the form of the body.   These lesions, coupled with their manifestations, are very interest-ing in themselves, but of course have no connection with primary carcinoma of the kidney, for which the case is reported.   It seems, proper, however, to state that no evi-dence of syphilis was found other than the possible relations to this disease found in the brain, though the autopsy was very thoroughly and carefully made.

"The right kidney was found of about the usual size and was normally located.   The capsule was neither adherent nor thickened.   The cortex was thick and regular, and all the markings were found to be distinct.   The tissue was firm.   The vessel walls showed no abnormalities, but the capillaries everywhere were greatly congested and the cut surface dripped blood and serum.   The cortical portions of the kidney were somewhat cloudy, and a general cortical parenchymatous degeneration seemed to be present.

"The left kidney presented the most interesting feature of the case, and the one which I think justifies me in pre-senting the case to you.   On the outer surface of the left kidney was found a globular mass, smooth, subcapsular, and

of less tension on palpation than the remaining portions of the kidney tissue. The vessels of the capsule covering this mass were greatly congested, and this mass, indeed the entire kidney, was found surrounded by considerable inflammatory tissue, most of which was noted as being of probably rather recent formation. There was found one vessel of about 1.5 mm. calibre, which entered the tumor mass directly through the capsule. The kidney being opened, the tumor mass was seen to be sharply differentiated off from the kidney structure by a thin but well-defined and complete capsule of connective tissue. The tumor was spherical in form, and measured sixty-three millimetres in diameter. It had a centre of a white cartilaginous appearance, and from this radiated about in regular spoke-like lines a stroma of similar substance. Between these radiating and anastomosing whitish paths were found islands of brownish tissue, resembling that of the remaining and uninvolved portions of the kidney. The tumor may be said strongly to resemble a series of the pyramids of the kidney arranged about a common centre. Vessels were not numerous in the stroma of the tumor, though the capsule was found to be quite vascular. The tumor was so located in the substance of the kidney that its central point was located about midway in the kidney and about the middle line of the zone bordering on the pyramids, but its most internal diameter jutted into the pelvis of the kidney, while its external periphery, as is well shown in the specimen, projected outward from the normal kidney contour. A diagnosis of adenoma was made from the gross appearances of the mass, and, as already stated, no other nodules of neoplastic nature were found in any other part of the body. Neither was any glandular enlargement present. Microscopic examination of the sections taken from various parts of the tumor give in all instances the same picture, that of carcinoma of the adenomatous type.

" I am induced to believe that the growth was originally an adenoma : First, from its shape and location, which are

those indicative usually of kidney adenoma ; second, from the fact that, while the growth was evidently of some months' standing, as is indicated by the thick capsule of fibrous tissue about the tumor, yet no metastases were found. This would seem improbable in a growth originally malignant in character, the probable age of which is considerable, and at the same time growing in an organ with so extensive a lymph supply as is present in the kidney. Third, in certain parts of the sections of the tumor the structure is typically that of adenoma ; this is especially true in those portions in which a connective-tissue stroma is abundant, as is the case near and in the limiting capsule of the tumor.

"Adenomata of the kidney are quite common, and as adenomata in other locations are quite prone to carcinomatous change, it does not seem in the least strange that it should take place here. We have, at Carnegie laboratory, a specimen of adenoma of the kidney, which shows in certain areas quite typical carcinoma. Delafield, in speaking of adenoma of the kidney, says that when these adenomata take a malignant course they are spoken of as carcinomata.

" Carcinoma is among the more rare of the primary tumors of the kidney, but numerous cases of it, however, are reported. Up to 1886 I have found one hundred and twenty-seven cases of primary cancer of the kidney reported, but among these are some congenital tumors and others in which the description is that more characteristic of the more common growth, sarcoma. It is more than probable that a considerable number of these growths were called cancer simply because they appeared to be of a malignant nature, and in many of these no microscopic examination was made. Dr. Shrady reported a case of primary carcinoma of the kidney before this Society in, I think, 1881. Harrison states, in the *Twentieth Century Practice*, vol. i., that carcinoma, when primary in the kidney, is usually confined to a single kidney, as is the case in the specimen I present.

" It seems unnecessary to speak of the impossibility of

ante-mortem diagnosis in such a case as this, and the chief interest seems to centre in the rarity of the growth and in its probable origin from a pre-existing adenoma."

HEMORRHAGIC PANCREATITIS WITH FAT NECROSIS; ABSCESS OF LIVER; INFECTION BY BACILLUS AËROGENES CAPSULATUS.

Dr. JOHN H. LARKIN presented this case.   He said:

" The family history of the patient was negative, and there was nothing of note about his personal history, except that he had gonorrhœa in the fall of 1896.   His last illness began, one month before he came under observation, with shooting pains in the right foot, leg, and knee.   These pains have recurred in severe attacks ever since, and have kept him from his work.   On April 19th, after drinking ice-water, he experienced terrible cramps in the right hypochondriac region, lasting all night.   During this time he had chills and fever, and the next morning he noticed that he was markedly jaundiced.   The vomitus was dark-colored, 'like mud.' The bowels have been regular until three days ago; since then they have been constipated.   On admission his temperature was 104° F.; pulse, 78; respiration, 36.   He was well nourished; the skin and conjunctiva were yellow; the heart and lungs were normal.   The liver extended from the fourth space to the costal border.   The splenic dulness began in the seventh space mid-axillary line, and extended to the costal border.   The abdomen was distended and tympanitic, and there was marked tenderness in the epigastrium. There was no œdema of the extremities.   Over both forearms and hands, and over the lower part of the abdomen, there was an orange-colored, macular eruption, varying in size from that of the head of a pin to a ten-cent piece, irregular in outline and coalescent in places.   The patient was delirious.   The blood examination showed the red cells to be normal in shape and number, and 22,000 white cells per cubic millimetre.

"*Autopsy.*—The autopsy was made six hours after death, by Dr. Ely, to whom I am indebted for the privilege of reporting this case. The body was well nourished, and the skin slightly jaundiced. When the peritoneal cavity was opened, a quantity of blood-stained fluid welled out, estimated to be about eight ounces. In the left hypochondriac region, behind and below the spleen, were some blood clots and fibrous adhesions. The whole heart was somewhat enlarged; there was an abundance of subpericardial fat; the muscle was somewhat hypertrophied; the valves and orifices were normal; and there was very slight atheroma of the aorta around the coronary openings. The lungs and stomach were normal. On passing the finger down the duodenum, a hard mass was felt in the region of the head of the pancreas. The gall bladder was moderately distended with thin, yellow bile, and contained about a dozen small gall stones. In the papilla, at the opening of the common bile duct, were lodged three small gall stones. The liver was slightly enlarged, and in its tissue were a number of small circumscribed necrotic areas, containing what looked like pus. There was one larger, ragged area of necrosis, containing red granular clots and detritus. The tissue surrounding this, and reaching nearly to the surface of the liver, appeared to be necrotic and somewhat soft, and was riddled with open canals, from which exuded frothy, blood-like fluid. The spleen showed parenchymatous hyperplasia and marked congestion. The head of the pancreas, on section, was firm, but contained areas of necrosis, hemorrhagic in appearance. The body of the organ was very largely disorganized, being bloody and soft, and below this, and lying behind and below the spleen was a large amount of soft, red, granular clot. Both the suprarenal capsules were necrotic. The kidneys showed parenchymatous degeneration.

"The following gives in detail the results of the microscopical examination of this case:

"Changes in the liver: There are chronic venous congestion of the liver, dilation of the central vein and surround-

ing capillaries, with consequent atrophy of liver cells in the immediate vicinity. In the examination of many sections taken from different parts of the liver, one gets different pictures of the lesions present. There are many areas of focal necrosis scattered in the liver parenchyma. These areas are in some respects identical with many of the focal necrosis seen in typhoid, diphtheria, and tuberculosis. They are immediately around the central vein, which is dilated. They are made up of liver cells alone, but as yet, for the most part, preserve their outline, are entirely devoid of nuclei, and stain faintly with eosin. The capillaries in the periphery of these necrotic areas are intensely engorged with red and white cells. The central veins in many places are empty; in other places they are filled with bacterial thrombi. Not all the central veins are surrounded by necrotic areas. In other portions of the lobules we have the same identical focal necrosis of liver cells, with and without the central mass of bacteria. In other sections examined there is no focal necrosis, but intense venous congestion; whole lobules changed into large blood lakes, with widespread disintegration of liver parenchyma. In still other sections, all one can see is a complete destruction of liver parenchyma from centre to periphery. There is loss of capillaries—a granular and fragmented nuclear mass, a condition not unlike the picture of acute yellow atrophy of the liver. Again, in some sections there is a loss of liver parenchyma, these empty spaces or air-holes, irregular in outline, larger and smaller, with flattened, necrotic, and nonnucleated cells, making up their border. The constant presence of bacteria at their periphery, and of swarming masses of bacterial emboli in the capillaries and central veins, is not to be lost sight of. In other sections the principal lesion is abscess formation, both of the miliary and large variety. There are loss of liver cells and replacement by a broken-down granular debris, leucocytes, fragmented nuclei, with flattening of necrotic liver cells at the periphery. In the larger abscess cavities the central detritus had

fallen out, leaving only a narrow band of leucocytes and granular detritus with necrosis of liver cells at the periphery.

"Changes in the spleen: The changes in the splenic tissue are, in a great many respects, identical with those in the liver, with the exception of abscess-cavity formation. The necrotic foci are, however, smaller and more numerous. There is little nuclear fragmentation.   Other sections show intense venous congestion with atrophy of splenic pulp. The occurrence of gas blebs, œdema of trabeculae, and a homogeneous, glassy condition of blood-vessels were at times noticed.

" Changes in the kidneys : There is no chronic productive inflammation.   There is parenchymatous degeneration of the epithelium of the tubules.   The capillary tufts in many places are plugged with bacterial emboli, which caused the subsequent death of the surrounding parenchyma.

"Changes in the heart muscle: There are interstitial myocarditis and some slight fatty infiltration.   The heart-muscle fibres seem to be broken up into short rods, separated from one another perhaps by a dissolving of the cement substance.   Scattered here and there are the same bacterial emboli, with the muscle fibres around, broken down and necrotic, and entirely devoid of nuclei.   Gas blebs in the myocardium are present in some sections, absent in others. We have the same focal necrotic areas, not attended by focal bacteria which could be stained in tissue, the necrosis consisting simply of a swelling and granular condition of muscle cells without nuclei, and the whole standing out sharply against the surrounding normal heart tissue.

" Changes in the pancreas and fat tissues : There is diffuse hemorrhagic infiltration of the interlobular and intercellular fat tissue, with atrophy and compression of the fibrous tissue.   In the interlobular tissue in other sections, leuco-cytes and fibrin outnumber the red blood cells, while the fat cells, filled with red blood, make large irregular blood lakes in which can be distinguished the faint outline of the

fat cell. .The areas of necrosis in the peripancreatic fat are
in places oblong ; in other districts of irregular, spade-like
form the whole mass is made up of granular detritus devoid
of cells or nuclei.   The outline of the fat cells is lost or
indistinct, the island with irregular borders shading off into
the surrounding fat tissue.   These necrotic areas stain faintly
with eosin ; some have a limiting zone of leucocytes and
small round cells, with many yellowish-colored and irregular
shaped crystals in the periphery.   In other sections the
replacement of the fat tissue by polynuclear leucocytes,
small, round, spindle, and large mononuclear cells is the
predominating feature, together with numbers of smaller
and larger rounded, needle-shaped crystals—some staining
faintly or not at all with eosin, others having affinity for the
nuclear dyes.   These spherical bodies are in the fat cells at
periphery of the necrosed area, and are perhaps nothing but
fatty-acid crystals.   In the interlobular tissue, in other
sections, instead of presenting the above lesions, there is
simply necrosis of the connective tissue, the interlobular
necrosis leading to the large areas of fat necrosis in other
parts.   In still other sections the fat tissue is normal, but
shows productive inflammation of the interlobular fibrous
septa, while the peripheral portions of fat show large, irreg-
ular, diffuse patches of small, round, and spindle cells with
delicate-walled blood-vessels, and not a few giant cells.
These areas look as if there was evident replacement of some
of the necrosed portions by what appears to be a fibro-
cellular tissue.   The foregoing changes are those which
have taken place in the peripancreatic fat tissue, and are
perhaps secondary to those changes to be described in the
pancreas ; but that the lesion could be primary in the peri-
pancreatic fat tissue and secondarily invade the pancreas is,
I think, an undeniable fact.   The lesion, after all, amounts
to nothing more than an extension by continuity.

" Pancreas : Some portions of pancreas are perfectly nor-
mal ; in other places the fibrous tissue between the lobules
and acini is considerably increased in amount ; in still others

the fat tissue predominates.   In many sections there is ex-
tensive fatty infiltration, both in and between the lobules.
There are numerous islets of focal necrosis in the parenchy-
ma, with scattered cells not arranged in definite acini.   The
interlobular connective tissues shows œdema and diffuse
hemorrhagic infiltration, the infiltration going in between
the lobules to a considerable degree.   The interlobular
spaces in other places are simply filled with clumps of dark-
brown material, containing many hæmatodine crystals.   The
parenchyma cells in these areas are necrotic and devoid of
nuclei ; in other lobules, especially in the districts of the in-
tralobular fat necrosis, the irregularity of the acini is lost, the
whole lobule being made up of a confluent mass of degen-
erated cells and clumps of protoplasm devoid of nuclei.

" That the process in the pancreas shows both old and re-
cent hemorrhage, I think, is certain.   Many of the lobules
show entire replacement by dark-brown fragmented masses,
with occasional hæmatodine crystals, while the more recent
hemorrhages are simply diffuse hemorrhagic areas of red
blood-cells and leucocytes.   Fat tissue taken from the re-
gions of the kidneys and adrenal glands shows a lesion iden-
tical with that of the peripancreatic fat.   On account of the
abscess formation in the liver, with subsequent infection by
the bacillus aërogenes capsulatus, portions of the viscera, in-
cluding the heart, lungs, liver, spleen, kidneys, and pancreas,
together with specimens of fat tissue, were hardened in abso-
lute alcohol.   These sections were utilized for staining bac-
teria in tissue.

" In all the tissues examined a bacillus was found which
stained quite readily with Gram's, Weigert's, and Loeffler's
method.   The bacilli were in clumps and clusters in the cap-
illaries and blood-vessels, and the centres of necrotic foci.   It
occurred in short chains having square-cut edges, the indi-
vidual ones showing rounded ends and staining diffusely
throughout with aniline dye.   While for the most part the
necrotic foci in the liver, heart, and kidneys contained a
central mass of bacteria, yet there were many other focal

areas of necrosis, especially in the spleen, liver, and heart, in which no bacilli could be demonstrated by the above stains.

" The bacteriological examination was made by Dr. Charles Norris. He was able to isolate two species of bacteria—one, the bacillus aërogenes capsulatus, which he obtained in pure culture ; the other, a bacillus whose morphology is similar to the bacillus coli communi. It is non-motile, and decolorizes by Gram's stain ; on lactose-litmus agar acid is produced ; no indol is formed after three days ; invisible growth on potato. No gas is produced in grape-sugar agar, and there is no coagulation of milk after four days. Although the exact nature of this bacillus is not known, a further study of it will undoubtedly be most interesting."

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Stated Meeting, February 9, 1898.

T. MITCHELL PRUDDEN, M.D., PRESIDENT.

A FOREIGN BODY REMOVED FROM THE ABDOMINAL CAVITY.

Dr. H. J. BOLDT presented a large gauze serviette and the portion of the bowel in which it had been lodged. He said that it was not at all uncommon for sponges, gauze compresses, and instruments to be left in the abdominal cavity through an error on the part of the nurse or by the oversight of the surgeon himself. He had been able to collect fifty-nine such cases, but that number could be quickly swelled tenfold if operators would publish accounts of their errors as well as of their successes. Only a few of these fifty-nine cases had been published. The two instances observed in his own practice were the following :

CASE I.—This was a case of total extirpation of the uterus and adnexa for cancer of the uterus. A gauze strip had been lightly packed in the pelvis and the house surgeon directed to remove it per vaginam three days subsequently. This was done, but it was not noted that another had been substituted. The patient's convalescence was uninterrupted,

but a few weeks after leaving the hospital she began to suffer from griping pain in the pelvis and abdomen, and from obstinate constipation.   After about two months she passed a strip of gauze with a fecal evacuation, and then her pain and constipation entirely disappeared.   Apparently the house surgeon had inserted the second piece of gauze beyond the edges of the vagina, and, the wound closing below the gauze, he thought it had been removed.

CASE II.—The other case was one of abdominal hysterectomy for myofibroma. The operation was done in the early part of 1897, and convalescence was protracted on account of an abscess of the abdominal wall and phlebitis. The patient was discharged after the healing of the wound, but complained of constant pain midway between the umbilicus and the epigastrium.   When she was seen in October, there was a swelling in this situation, which appeared to consist of adherent coils of intestine. On November 3, 1897, the abdomen was reopened and the diagnosis found to be correct, but the patient sank so rapidly during the disentanglement of the intestine that the operation could not be completed.   An abdomino-intestinal fistula resulted, and, a fatal termination being inevitable unless relief could be afforded, the abdomen was again opened on January 10th.   After an unusually difficult separation of the adhesions, during which the bowel was injured five times, a portion of distended bowel presented itself, and on examination of a rent in the bowel near this place a piece of discolored gauze was discovered.   On withdrawal it was found to be the large gauze serviette that he had just exhibited to the society.   The distended bowel immediately collapsed after the removal of the piece of gauze.   The only explanation for its presence there was that the operating nurse had, in some way, made an erroneous report.   The protracted convalescence had been due to the inflammatory changes caused by the foreign body gradually perforating the bowel, and this inflammation had caused the adhesions and tortuousness of the bowel, and had thus prevented the expulsion

of the gauze in the natural way. The portion of gut in-
jured during the operation was resected, and an anastomosis
made with sutures. The woman died from shock two or
three hours after the completion of the operation. The
walls of the intestine exhibited great thickening as a result
of the inflammatory changes set up by the prolonged irrita-
tion of the gauze. The speaker said that a study of these
cases showed that the perforation of such a body into the
intestine did not seem to be accompanied by any special
symptoms. Unless such foreign bodies found their way
into the small intestine the chances of their being expelled
were good. If they did not perforate the bowel, they usually
found their way to the surface and gave rise to local symp-
toms which led to investigation. In some instances the for-
eign body worked its way to the scar made by the primary
operation, and there produced a fistula which, if enlarged,
disclosed the nature of the trouble. As to the prevention of
these accidents, Dr. Boldt said that surgeons differed. They
all agreed that it was improper to use small pads or
sponges as temporary packing, and that the sponges, pads,
and clamps used should be counted before and after the
operation. A good rule followed by some surgeons, to
prevent leaving a clamp behind, was to ligate every vessel
as soon as it had been seized and secured with the clamp.
The method which he had himself recently adopted was as
follows : If a small area in the pelvis was to be temporarily
tamponed, a long strip of gauze was used, and either a long
clamp was left attached to it or the end of the gauze
was left protruding some distance from the abdominal
cavity. For protecting the peritoneal cavity, sterilized tow-
els were used in preference to gauze compresses. For
smaller surfaces large gauze compresses were employed,
and to these was attached a piece of silk or tape, and to the
end of this a pair of forceps. No pad was permitted to
be torn up for an emergency, and all pads discarded during
the operation must be thrown into a special receptacle.
All pads and forceps were controlled by double count before

and after the operation. If a large number of small pads were required, they were never left in the cavity, even temporarily. By attaching tape and forceps to the gauze pads, the missing compress was readily found without unnecessary handling of the abdominal contents. The abdomen should never be finally closed until all pads and towels have been accounted for, and this counting should be done by the surgeon himself or by a reliable assistant.

Dr. HARLOW BROOKS said that he now had under treatment a patient in whom a foreign body had found its way out through the original incision, forming a fistula. The patient, a young woman, had been subjected to ovariotomy in Philadelphia. Union had been delayed, and about one week after leaving hospital she had come to New York City. At that time there was a small discharge of pus from the lower part of the abdominal incision. The house surgeon introduced forceps and drew out a long piece of iodoform gauze. This was followed by the development of a hernia, but after a reparative operation she made a good recovery. The original operation had been done in the clinic of an eminent and careful surgeon.

ABSENCE OF THE VERMIFORM APPENDIX.

Dr. BOLDT then presented as an anatomical curiosity a cæcum that had been removed by him post mortem four or five weeks after a laparotomy. There was no trace of the appendix vermiformis—a condition which he understood to be quite rare.

LEUKÆMIC INFILTRATION OF KIDNEYS, LIVER, AND HEART.

Dr. J. S. THATCHER presented sections, photographs, and drawings showing a leukæmic or lymphoid infiltration of the different viscera. The patient, a girl, three and one-half years old, was brought to the Presbyterian Hospital at 7:30 P.M., and died at 5 A.M. the following morning. The only history obtained was that she had been getting weak and anæmic, and had begun to have chills and sweatings about

one month before. A few days prior to admission she had
vomited blood and had also passed blood in the stools. On
admission she was very cachectic, the spleen was much en-
larged, and she had a bloody stool after an enema. The
pulse was from 155 to 200 ; respirations, from 30 to 60 ; and
the temperature, from 100° to 104.5° F. At the autopsy
numerous ecchymoses were found beneath the endocardium
and pleura, in the omentum, the mucous membrane of the
stomach, the kidney, and the lungs. The heart muscle was
fatty. The mesenteric lymph nodes were enlarged. Some of
the blood from the heart was examined, and found to contain
an abnormal abundance of white cells. Cultures from the
lungs, liver, spleen, and kidneys showed pure growths of
cocci, which had a tendency to form short chains. Micro-
scopical examination of sections of the heart, liver, kidney,
and stomach showed areas containing small cells, the nuclei
of which were usually small, rounded, and oval. The con-
tents were granular and stained rather deeply with hæma-
toxylin. The cell bodies were not appreciable, nor could
any fibres be detected between the cells except where the
latter had invaded fibrous tissue.   These areas occupied
about one-third of the total liver sections and one-half the
area of the kidney sections examined. The proper tissues
of the organs seemed to be scarcely affected by the presence
of these areas. From these facts he had concluded that it
was a lukæmic or adenoid infiltration rather than an inflam-
mation.

Dr. C. A. HERTER said that he had had an opportunity
to examine these specimens previously, and he had shown
them to Dr. W. H. Welch, who had been much interested in
them.   The latter gentleman had expressed the opinion
that the lesion was a leukæmic infiltration rather than an
inflammation.

The PRESIDENT also thought it a leukæmic infiltration.
The case, he said, was particularly interesting because of its
extent.   In regard to nomenclature it was a question
whether such infiltrations should be called " adenoid."   He

thought the whole matter would be clearer if we abolished the term " glands " for lymph nodes, and he suggested the term " lymphoid " or " indifferent cell " infiltration as applicable to the condition under discussion.

DISSECTING ANEURISM.

Dr. GEORGE P. BIGGS presented a specimen showing a dissecting aneurism of the aorta. It was obtained at autopsy on a colored man, aged thirty-five years, a waiter by occupation, who was admitted to the New York Hospital on January 21, 1897, with the following history: Never had rheumatism ; alcoholic habit marked ; no evidence of syphilis except a few suspicious scars on the legs. He had had cough for some time, but otherwise he was well until one month before admission to the hospital, when the cough became more troublesome and severe attacks of dyspnœa developed. Since that time he had steadily lost flesh and strength ; the legs had become swollen and the dyspnœa more constant. Physical examination: Harsh breathing and a few moist râles over both lungs ; heart moderately hypertrophied, the apex being felt in the sixth intercostal space five and one-half inches to the left of the median line ; systolic and diastolic aortic murmurs quite pronounced. The case was under observation for three months and during that time the urine contained from five to twenty per cent. (by bulk) of albumin ; the pulse was from 80 to 120, and the temperature from 99° to 100° F., except one month before death, when for three days it rose to 101° and 104° F., and marked pulmonary signs developed on the right side. Death resulted from heart failure and pulmonary œdema. The *Autopsy* showed general anasarca and chronic venous congestion. A large thrombus occluded the branch of the pulmonary artery going to the right lower lobe of the lung and practically converted the whole lobe into a red infarction. The remainder of the lungs was congested and œdematous. The heart was considerably enlarged, the cavities being dilated and their walls thickened. The valves were normal

except the aortic, the cusps of which were considerably thickened and retracted. The muscular substance appeared normal. There was considerable dilatation of the pulmonary artery, due evidently to induration about it and compression of it as it passed under the aortic arch. The coronary arteries and aorta were moderately atheromatous. At the junction of the transverse and descending portions of the aortic arch, and looking to the left, there was found an oval opening measuring three and one-half centimetres antero-posteriorly and one centimetre vertically. The opening had a perfectly smooth, rounded border, and led into an old dissecting aneurism, the wall of which was formed exclusively by the adventitia and external layers of the media of the aorta. In its upper portion the aneurism was to the left of the aorta but in the greater part of its course it lay in front of it, and caused almost complete flattening of the aorta against the spinal column. The aneurism measured twenty-three centimetres in length and four centimetres in diameter, and it terminated by communicating again with the aorta a little below the cœliac axis, through an oval opening measuring two centimetres by one centimetre. The lining of the sac had practically the same appearance as that of a dilated, atheromatous aorta. Most of the intercostal arteries arose from the aorta, but the eighth, ninth, and tenth left arteries came directly from the aneurism. The cœliac axis also arose from the aneurism, but there was an opening of the same size exactly opposite it, in the anterior wall of the aorta, which undoubtedly indicated the original connection of the vessel with the aorta. The force of the blood current would easily explain the obliteration of the portions of intercostal arteries and cœliac axis which at first traversed the aneurism. Dr. Biggs said that the specimen was very similar to one presented to the Society about two years ago by Dr. Herbert Williams, of Buffalo, who at the time considered it a double aorta but later concluded it was a dissecting aneurism.

Dr. H. N. HEINEMAN said that it had been fairly well established that dissecting aneurisms were the result of trau-

matism. The traumatism was usually at the base of the aorta, and assumed the form of a transverse break in the aorta, which was in direct opposition to what took place when there was fatty degeneration of the intima and media, for in the latter case the rupture was longitudinal. Such a dissecting aneurism might heal, or might be carried by the person for many years without special discomfort. Meanwhile the aneurism dissected its way down to the cœliac axis, or to the renal arteries, and then found its way back to the aorta. This was the reason why the person did not die immediately from it. There was a very remarkable specimen in the museum of Giessen University, which had been taken from a man who thirteen years before, after having been injured in a fight, had developed what was then supposed to be heart disease. He recovered from this, and thirteen years later died under the observation of one of the professors who had seen him in his first illness. The post-mortem examination showed a dissecting aneurism of the aorta.

A VALVULAR LESION WITH DISAPPEARANCE OF VEGETATIONS.

Dr. W. B. NOYES presented the heart of a child of thirteen years who for seven months before admission to the hospital had suffered from cough and shortness of breath and pain in the cardiac region. The heart action was rapid, the respirations were accelerated, and the expectoration at times bloody, but no murmur was heard. The child died suddenly a week after admission, with no special premonitory symptoms. At the autopsy the mitral valve was found to be reduced to the size of a lead pencil, but there were no vegetations on it. The right heart was very much dilated. The specimen was presented as an instance of a valvular affection which had originated from a rheumatic endocarditis one year before, the fresh vegetations having disappeared. There was, of course, a possibility of the lesion being congenital. During life the affection of the heart had been considered to be functional.

EXTREME MITRAL STENOSIS AND DILATATION OF BOTH AURICLES, WITH LARGE ORGANIZING THROMBUS OF LEFT AURICLE.

Dr. EUGENE HODENPYL presented this specimen together with microscopical sections. It had been removed from a man, seventy-four years of age, who for many years had suffered from chronic diffuse nephritis, repeated attacks of asthma, and bronchitis. He died during an asthmatic attack. At autopsy the right auricle was found enormously distended with recent blood clot, which extended into the larger branches of the pulmonary arteries. The left auricle was distended and firm. Its cavity was filled with an old decolorized clot firmly adherent to the wall of the auricle. This showed evidence of organization about its periphery. There was extreme stenosis of the mitral orifice.

STUDIES ON GANGLION CELLS; A PRELIMINARY COMMUNICATION.[1]

By JAMES EWING, A.M., M.D.

Although, during the past decade, a large and rapidly increasing number of observations have fully established the superiority in many respects of Nissl's method of staining nerve cells, and some facts have been proven and many more claims made regarding the significance of the changes demonstrated by the new stain, it has not yet been made possible fully to interpret the great variety of morphological appearances of the ganglion cell revealed by Nissl's technics.

In nearly every detail of the subject there has been great or irreconcilable difference of opinion among recognized authorities. A large number of modifications of Nissl's original procedure have been suggested, and their value and reliability variously estimated. The lack of uniformity in the effects of many fixing-agents employed has been a serious obstacle in the way of separating artifacts from

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[1] Complete paper with illustrations in "Studies from the Department of Pathology, College of Physicians and Surgeons, New York," vol. vi.

pathological alterations. The normal histology of the ganglion cell in different regions of the central nervous system has not been fully determined, and we are still far from a knowledge of its ultimate structure, although much progress has been recognized in this department during the last few months. In 1895 practically nothing was known about post-mortem alterations in ganglion cells. In the group of infectious diseases, a series of cellular changes has been described by some observers, consisting principally in various grades of chromatolysis, while other investigators have failed to find these changes or have denied their importance. The cellular lesions induced by fatal doses of mineral and vegetable poisons have been described as characteristic and uniform by some writers, while others have failed to regard these appearances as specific. Probably the specific character of the peculiar form of degeneration of ganglion cells following experimental section of peripheral filaments, and consisting of central chromatolysis and eccentricity of nucleus, have been established beyond a doubt; but the observations are as yet entirely inadequate to warrant the statement that wherever such forms of degeneration are seen these cells have suffered a loss of function of their axis-cylinder processes.

Attempts have been made to distinguish this secondary degeneration of ganglion cells from the primary changes induced by circulating toxic agents, but the differences between these sets of changes have never been intelligently described, so far as the writer can find.

The morphological changes resulting from activity or fatigue of ganglion cells have formed the subject of several very painstaking studies, but to-day no definite morphological appearances can be regarded as indicating rest, activity, or fatigue on the part of the ganglion cell.

Profound changes in the anterior horn cells of the lumbar cord have several times been noted after ligature of the abdominal aorta in animals, but somewhat similar changes have been found under conditions apparently very dissimi-

lar. Moreover, the whole subject of the importance of chromatolysis in the pathology of the ganglion cell received a serious blow from the evidence recently furnished that this condition may be extreme in still functionating cells (Gold-scheider and Flotau). In hibernating animals also the chromophilic bodies have been found to disappear (Levi).

The wide field opened up by these recent results of experimental pathology for the application of Nissl's method in the study of the central nervous system in general diseases has led the writer to undertake the systematic examination of the central nervous system in a series of cases, representing a variety of conditions, and coming to autopsy at Roosevelt Hospital during the past two and one-half years. These cases may be grouped as follows:

Infectious diseases: Lobar pneumonia, 3; typhoid fever, 3; acute purulent meningitis, 3; tetanus, 1; pernicious malaria, 1; empyema, 1; peritonitis, 2; septicæmia, 2; pyæmia, 1.

Auto-intoxication: Uræmia, 7; eclampsia, 3; sun-stroke, 3; epilepsy, 2; diabetic coma, 1; pernicious anæmia, 3; leukæmia, 1; asphyxia, 1.

Acute poisoning: Alcoholism, 3; morphinism, 2; carbolic-acid poisoning, 2; hydrochloric-acid poisoning, 1.

Mechanical disturbance of cerebral circulation: Hemorrhagic pachymeningitis, 3; subdural hemorrhage, 3; acute ependymitis, 1; thrombosis of basilar artery, 1; intraventricular hemorrhage, 1.

Miscellaneous: Aneurism of aorta, 1: rupture of viscera, 2; tabes and carcinoma, 1; peripheral neuritis, 1; Landry's paralysis, 1; hemiatrophy of brain, 1; asphyxia neonatorum, 1.

Also experiments and studies were conducted on animals to determine in some degree: 1, the normal structure of ganglion cells; 2, the effects of post-mortem processes; 3, the effects of artificial heating; 4, the effects of acute alcoholic poisoning; 5, the effects of snake poison; 6, the effects of cold and starvation.

The conclusions which it is believed may be justified by the study of this material it is intended here briefly to summarize :

I. TECHNICS.

Of the fixing-agents recommended for the preservation of the chromatic structure of ganglion cells, the writer has used extensively Lang's fluid, alcohol of ninety-five per cent., and Van Gehuchten's fluid.   Formalin in concentrations varying from five to twenty-five per cent.; formalin in five per cent. solution, saturated with bichloride ; saturated solutions of picric acid and bichloride ; and saturated aqueous solution of bichloride—have all been tested with fairly satisfactory results, but without finding in them any distinct advantage over other fluids. Long's solution has proved generally unsatisfactory and was discarded entirely.   Under its action the chromatic structures appear roughly granular and in thin sections often indistinct in outline. The uneven penetration of the acetic acid and metallic salt leaves many confusing appearances, especially in deep-lying nuclei, and the sections of tissues hardened in this fluid fade more rapidly than with other methods.   In uniformity of results probably nothing is superior to alcohol, ninety-five per cent. or absolute, as originally recommended by Nissl. Van Gehuchten's fluid has proved very reliable in the writer's hands, and may be very highly recommended, especially on account of its rapid penetration.

Among many proposed modifications of Nissl's staining-method, the writer has found none superior, except for special purposes, to the following very simple procedure : Stain the section for one or two minutes in a one-per-cent. aqueous solution of methylene blue, heating gently.   Wash in water ; decolorize in absolute alcohol until the alcohol no longer visibly dissolves the stain. Clear in oil of cajuput and mount in Canada balsam.   Neither in the addition of alkalies to the dye nor of anilin oil to the alcohol have distinct advantages been noted.

For differential staining of the "achromatic" reticulum, Held's method with erythrosin and methylene blue has been used with satisfactory results. The most perfect demonstration of the cyto-reticulum secured by the writer has been in freshly teased specimens fixed by heat, 100° C., and stained either by methylene blue alone or by erythrosin and methylene blue; but this procedure is not to be recommended for general purposes.

It may seem almost a superfluous statement, but it is, nevertheless, a conclusion that has been reached only after long study and consideration, that when fresh nervous tissues, cut in pieces not more than two or three millimetres in thickness, are treated with alcohol, ninety-five per cent., or by Van Gehuchten's fluid until thoroughly penetrated, full reliance may be placed upon the appearances that the ganglion cells may present, and any serious disturbing effect of fixation and staining may be thrown out of account.

II. HISTOLOGY.

The present study has not been directed toward the investigation of many of the finer details of cellular structure, but has had reference mainly to the chromatic elements specially demonstrated by methylene blue. From the minute study of normal and pathological specimens, aided materially by the use of artificial light, apochromatic lenses, achromatic condenser (on which oil should be placed), the writer concludes that the so-called chromatic substance of the human ganglion cell is invariably arranged in the form of a network, with nodal thickenings very prominent in the anterior horn cells, Purkinje's cells, and the cells of the spinal ganglia. In Purkinje's cells, however, the chromatic threads connecting the chromophilic bodies are much thicker than in the cells of the spinal cord and ganglia.

On comparing sections stained by Held's method (erythrosin-methylene blue) with those stained by methylene blue alone, and by attending to the above details of micro-

scopical technics, the writer finds that the so-called "achromatic" reticulum of Held is always demonstrable by methylene blue and is not strictly oxyphile, although much more so than are the nodal thickenings, *i. e.*, the chromophilic bodies. It does not appear, therefore, that the use of erythrosin, in so far as it demonstrates this reticulum, is of any great advantage over the ordinary method of staining by methylene blue. Moreover, under the above conditions, there appears to be no great difficulty in discerning the fibrillar structures of cell processes as described by Flemming, this character being very distinct in the dendrites of Purkinje's cells; although the writer finds that these fibrils possess numerous lateral anastomoses, as shown in Held's drawings of cells and processes stained by erythrosin.

In addition to this cyto-reticulum, chromatic or achromatic, stainable by both methylene blue and erythrosin, there is a cytoplasm not fully demonstrable by either dye, but with acidophile tendencies, in which it is believed that there are important pathological changes, the early evidences of which are beyond the reach of any method of demonstration yet described.

Of the radiating rows of oxyphile granules depicted by Held at the roots of axis-cylinder processes, the writer has been able to find only indistinct traces. In the thinnest and most intensely stained specimens that could be secured this area appears granular, but the granules are usually distributed irregularly.

The coarsely reticular portion of the cell body is surrounded partly by a finely granular oxyphile cytoplasm similar to that found in the axis-cylinder process, and corresponding to Held's "axis-cylinder Geflechte."

A very abrupt and distinct line of demarkation between this oxyphile envelope and the coarsely reticular portion of the cell body may be demonstrated, in freshly teased specimens, in what may be termed the polar dendrite. Probably the continuation of the granular oxyphile substance, *i. e.*, of the axis-cylinder process, fills in the meshes of the

reticulum of the cell body. If this be true, the oxyphile cytoplasm furnishes the material which undergoes pigmented and other forms of degeneration, a great variety of stages of which were noted in the present cases. If this be true, also it follows that the essential lesions that lead to the loss of function and conducting power of the nerve cell are to be found, not in the chromatic reticulum or bodies nor in the so-called achromatic reticulum, but in the enclosed cytoplasm. Moreover, this granular oxyphile substance of the axis-cylinder process is found abundantly enveloping the dendrites, at least of motor ganglionic cells; and this fact must be regarded as evidence that the dendrites, as well as the axis-cylinder process, take part in the function of conducting impulses.

This conclusion has been already reached by Held and Apathy, working with entirely different technical methods.

III. POST-MORTEM CHANGES IN GANGLION CELLS.

The examination of the first few cases of the present series emphasized the necessity of determining the effects of cadaveric processes in the chromatic structures of the nerve cell. Observations were therefore made upon the course of putrefactive changes in the ganglion cells of animals, whose brains and cords were exposed to the air for periods varying from one to seventy-two hours, at different seasons of the year. Comparisons were then made with material secured from autopsies. From these observations it appears that the earliest cadaveric changes consist usually in :

1. Nuclear changes. The chromatin of the nucleolus diffuses through the nucleus, causing broad thickenings in the intranuclear network or in the nuclear membrane, and leading finally to a deep and diffuse chromophilia of the nucleus. The nucleolus may become subdivided. In advanced stages the nucleolus shrinks, becomes very small, and the outlines of the darkened nucleus are shrivelled and irregular.

2. Changes in the chromatic reticulum of the cell body.

These consist essentially in a granular subdivision of the chromophilic bodies and reticulum, without actual loss of chromatic substance.   This alteration gives a characteristic uniformly granular appearance to the cell body, which is not difficult to distinguish from any vital pathological alteration as yet encountered by the writer.   Vacuolation is a nearly constant and sometimes very prominent feature of the process.   Similar changes, accompanied by rupture and shrinkage, early affect the dendrites.   No uniform sequence or rate can be given for the progress of cadaveric changes which follow the ordinary rules of putrefactive process, being influenced by the condition of the tissues at death, by the character of ante-mortem and post-mortem infections, and by many local external conditions.

IV.   CHANGES IN GANGLION CELLS IN GENERAL DISEASES.

(*a*) Infectious diseases.   In all of the specific infectious diseases coming under observation, cellular lesions of varying extent were found in the central nervous system, but the prominent feature in this group of cases was the lack of uniformity in distribution and intensity of these lesions. The changes included nearly every variety of acute cellular alteration that the writer has found described, including central or peripheral, partial, circumscribed, or complete chromatolysis, eccentricity of nuclei and nucleoli, and apparent loss of processes.   In some regions the changes seemed to affect the chromatic substance only, while the nucleus and cyto-reticulum appeared intact ; in other instances, to the simple chromatolysis was added a variety of changes in the cyto-reticulum, cyto-plasm, and nucleus.

In pneumonia the medullary nuclei suffered most severely, while the cortical cells and lower spinal stichochromes often appeared little affected.

In typhoid fever the lesions were usually more general, and in the cortex much more marked.

In the case of tetanus the cortical cells suffered most, and in this region the stichochromes were uniformly and

markedly bleached. There were moderate changes in the deep medullary nuclei; very few in the twelfth nucleus and in the cord.

In meningitis, empyema, peritonitis, septicæmia, pyæmia, and pernicious malaria, lesions of very irregular distribution were observed.

In most of the seventeen cases of this group attention was continually drawn to the presence of perfectly normal-looking cells, usually stichochromes, either lying singly in nuclei of which the other cells were much damaged or over larger areas which appeared to be unaffected by the fatal bacterial toxæmia. The irregularity in the occurrence of the lesions is well illustrated in a case of meningitis, in which cells of the twelfth nucleus immediately adjacent to a tuberculous exudate showed only slight chromatolysis, while the more distant deep-lying nuclei of the same section were entirely bleached.

(*b*) Auto-intoxications. Under this heading are grouped twenty-one cases, including uræmia, eclampsia, sunstroke, diabetic coma, epilepsy (dying from other causes), secondary pernicious anæmia and leukæmia. In all of these cases cellular lesions were found, of the same general character, and, with some exceptions, with the same lack of uniformity in distribution and intensity as in the preceding group.

From the study of seven cases of uræmia the writer has been unable to find any characteristic lesion of the nerve cells in this condition, all the changes observed having been noted in a great variety of entirely different diseases.

In one of three cases of eclampsia, dying in the twenty-first successive convulsion, the nuclei of Purkinje's cells were markedly shrunken and chromophilic and the nucleoli enormously swollen. The other cases had few convulsions and did not show this peculiarity. Its significance is of course uncertain.

In one case of sunstroke there was marked bleaching of most cortical and medullary cells. In another—temperature, 109° F.—very slight changes of the same character (uni-

form chromatolysis), were observed in the medullary nuclei only.

The stages of chromatolysis exhibited by the ganglion cells in sunstroke appear to be identical with those induced in rabbits by artificial elevation of temperature.

(c) Acute poisoning. In cases of acute alcoholism rather rapidly fatal from the effects of the drug alone, the usual lesions, now rather frequently described, were observed. The characteristic bleaching of the cells was here of somewhat uniform distribution, but not invariably so in every case.

In two cases of carbolic-acid poisoning, fatal within two or three hours, no characteristic lesions could be found. Possibly cases of longer duration might show a characteristic lesion referable to this common poison.

In acute morphine poisoning, somewhat peculiar changes were noted throughout the cortex and medulla. These consisted in the appearance of irregular areas in the bodies of the cortical and medullary stichochromes, affected by a peculiar form of chromatolysis ; in great irregularity of outline of the cell body ; and in the heaping of masses and rods of chromatic substance about one edge of an eccentric nucleus.

In a case of hydrochloric-acid poisoning, although the effects of the acid were distinctly noticeable in the blood of the general circulation, no peculiar changes were found in the morphology or staining-reaction of the nerve cells.

(d) Non-toxic conditions ; mechanical disturbance of the cerebral circulation. In a group of cases characterized by mechanical obstruction to the cerebral circulation, very uniform and profound cellular changes were found throughout the brain and medulla.

These cases include three of hemorrhagic pachymeningitis, three of subdural hemorrhage, and one each of intraventricular hemorrhage, thrombosis of the basilar artery, and acute ependymitis.

In these cases all the more advanced stages of diffuse chromatolysis, up to almost complete disappearance of

chromatic substance, were found.   Here the chromophilic
bodies were not subdivided, but appeared to shrink grad-
ually, leaving finally only the original and now very faint
cyto-reticulum.   The uniformity of distribution of this
chromolytic process was á very striking feature in these
cases, very few cells escaping extreme alterations, limited
usually to the chromatic structures.   In all of the cases
there was distinct microscopical evidence of venous stasis
in the circulation, and to this factor, arterial anæmia and
venous congestion, the writer must refer the chromolytic
changes.   The cellular lesions found in this group of cases
appear to resemble closely the effects induced in the lumbar
cord by ligature of the abdominal aorta.

V. GENERAL CONSIDERATIONS.

From these observations on the condition of the ganglion
cells in various infectious diseases, it appears that very viru-
lent toxæmias may and frequently do fail to cause any
alteration in nerve cells demonstrable by Nissl's method.
In fact, it would seem that the chromatic reticulum and
bodies, especially of the stichochrome cells, are compara-
tively resistant structures to the action of many bacterial
toxins.   The most perfect examples of the motor ganglion
cells of the cortex secured in the entire course of this study
came from a case of intra-alveolar pneumonia, of septic
character from the first and terminating in prolonged
delirium and coma.

In a case of rapid septicæmia experimentally induced in a
rabbit, many spinal stichochromes were found harboring
bacilli in the bodies of the cells, which, nevertheless, showed
slight or no evidence of chromatolysis.   Babes has observed
the same condition in the spinal ganglia in leprosy.

In nearly all the bacterial toxæmias examined, the twelfth
cranial nucleus was found comparatively little affected or
quite intact.   Further, the conclusion seems justified that
the lesions actually found in the brain and medulla in these

cases are not wholly referable to the direct action of the circulating toxin, but to some other intermediate agency. Otherwise, it becomes difficult to explain the very frequent occurrence of one medullary nucleus practically intact, immediately adjoining a second of which the majority of cells are in an advanced state of chromatolysis ; and even more difficult to explain the presence of nearly or quite normal cells in the midst of badly altered ones.

From the marked resemblance between the cellular changes in these cases with those known to follow the destruction of axis-cylinder processes after experimental section of nerve trunks, or the anæmia caused by ligation of vessels, there is strong evidence for believing that most of the alterations of nerve cells seen in the above infectious diseases are not due to the direct action upon the cells of the circulating toxin, but followed after loss of function in cell processes or loss of blood supply in capillary foci.   Such intermediate lesions may reasonably be referred to disturbances of local circulation, œdema of tissues and meninges, capillary embolism, thrombosis, and stasis, obstruction in pericellular lymph spaces, and lesions of nerve trunks. Another possible intermediate factor in these cellular changes must not be ignored.   In some of the cases uræmia of the present series, the medullary nuclei, especially the tenth, and the " nucleus ambiguus," suffered very much more than in others, and in these cases the clinical record showed that the patient had suffered from extreme dyspnœa and cardiac weakness for some time before death, while in other cases death occurred suddenly in convulsions.   Also, in cases of pneumonia the above medullary nuclei were always badly damaged.   These and a number of related observations seem to point to the probable importance of overaction and fatigue in determining the distribution of these cellular lesions in infectious diseases.

In another group of infectious diseases in which the virus is located principally in the central nervous system, *e. g.*, hydrophobia, and of which the present study includes but

few examples, it is evident that the presence of toxins and bacteria in and about the nerve cells leads to extreme and widespread cellular lesions affecting the cytoreticulum, cytoplasm, and nucleus, as well as the chromatic bodies.

From the study of the cases of poisoning by chemical agents, it appears that these poisons may in rapid cases abolish nervous function without leaving demonstrable lesions in the nerve cells. On the other hand, when the action of the poison is more prolonged, at least twelve hours, these cases seem to present very marked and often characteristic changes in the chromophilic substance. Similar conclusions have, of course, long ago been drawn from the experimental study of the effects of various poisons on animals, and the present cases, while furnishing examples of the effects of two more of these poisons, merely indicate how far the results of experimental study may be applied to the ordinary cases occurring in the human subject. How far the influence of the above-mentioned intermediate conditions—disorders of circulation and loss of function in cell processes—may be traced in this class of lesions, is a subject deserving of consideration. Dilatation of capillaries is a marked feature in the alcoholic brain, and the lesions are identical in appearance with those of artificial anæmia; while morphine has a specific action on nerve fibres, and eccentricity of nuclei is strikingly frequent in fatal poisoning by this drug.

GENERAL CHARACTER OF THE LESIONS OBSERVED IN GANGLION CELLS IN GENERAL DISEASES.

The minute study of the structure of the altered cells throughout the present study indicates that in most acute lesions the process of chromatolysis is one and the same, although different stages may present very dissimilar appearances. In the lesions referable to local anæmia and consisting in uniform fading of the chromatic substance, the chromophilic bodies appear to shrink gradually, leaving the

chromatic or achromatic reticulum faintly visible, but of uniform density throughout the cell body. Often the last remnants of the chromatic nodal thickenings appear as fine granules, which are integral parts of this reticulum. In this case the cells may have a faintly granular appearance. The stages of the process may be readily followed in the cases of mechanical obstruction to the cerebral circulation. Or the fading may begin at several points in the chromatic body, giving the cell a distinctly granular appearance at an early stage of the process, but ending in the same condition of complete loss of nodal thickenings and more or less uniform preservation of underlying reticulum. These changes may be noted after section of peripheral filaments or after the action of various poisons.

Besides the changes in the chromatic substance only, more significant lesions, affecting the nucleus, cyto-reticulum, and cytoplasm, may in some instances be found, and these alone seem to deserve classification as true degenerative changes. The nucleolus may be faded, swollen, vacuolated, subdivided, or displaced. The nuclear membrane and intranuclear network may be found granular, disintegrated, irregular, or entirely absent. The cyto-reticulum may be uneven, granular, distorted by vacuoles, or may be invisible. The cytoplasm becomes the seat of vacuoles, it may become coarsely granular, and these granules may show altered staining reactions and refrangibility. The cell borders and processes may become shrunken and irregular.

The writer finds, however, upon the closest possible scrutiny, no distinct difference in the appearance of the majority of cells in cases dying from alcoholism, sunstroke, tetanus, and thrombosis of the basilar artery, or other mechanical lesions. All exhibit phases, often identical, of simple chromatolysis. Moreover, this uniform end result of the chromolytic process may be reached without distinct change in the normal morphology of the nucleus.

These facts seem to indicate, further, that the cell which is thus by a variety of influences robbed of its chromatic

substance must not be regarded as in a state of degeneration comparable to the condition of the renal cell suffering from the effects of arsenic, and no longer showing chromatic reticulum or stainable nucleus.

The true degenerative process may not and frequently does not begin, as the writer believes, until chromatolysis is complete. In support of this conclusion may be cited : 1st, the common absence of nuclear changes in these altered cells ; 2d, the preservation of their cyto-reticulum ; 3d, the functional activity demonstrable in such cells in over-heated rabbits ; 4th, certain general considerations on the significance of the chromophilic substance of ganglion cells, presently to be noted.

The first two of these points have already been referred to. In respect to the third item, it may be said briefly that the writer has many times repeated the experiments of Goldscheider and Flotau in subjecting rabbits to high temperatures, and finds that the chromophilic bodies of the anterior horn çells may be largely obliterated, and yet these animals running actively about the laboratory. However, the writer found it very difficult to avoid the fatal limit in the exposure of the animals to artificial heat, and does not fully agree with Goldscheider and Flotau in their claim that the motor functions of these extensively altered cells are practically normal, as in his experiments there was considerable motor paresis and extreme reflex hyperæsthesia, the animals sometimes dying unexpectedly in general convulsions.

The fourth point leads to the conclusions as to the significance of the chromatic substance of nerve cells :

1. Reference must again be made to the fact, amply demonstrated by the present study, that the chromatic substance of the nerve cell is much more susceptible to the influence of disordered circulation than to the action of very virulent bacterial toxins.

2. It is an extremely significant observation of Levi's, if it can be verified, that in animals the chromophilic bodies

disappear during hibernation. The validity of this statement the writer is now investigating.

3. While the studies of Hodge, Mann, and Lagaro, on the effects of exhaustion on the nerve cell, have not shown that the exercise of functional activity leads to any reduction in the quantity of chromatic substance in the cell, these studies are now generally regarded as irrelevant to their subject, as the method of excitation employed—electrical stimulus—secures in no respect the condition of complete fatigue. The relation of the chromatic substance to the activities of the cell still remains, therefore, a matter of conjecture.

4. In the premature and even in the full-term infant, the chromophilic bodies have been found to be faint and imperfectly developed.

From these general considerations on the present state of our knowledge, the conclusion seems justified that the chromophilic substance of the ganglion cell represents a state of physiological nutrition, which may vary between the full development in the anterior horn of the lumbar cord in the human adult, and the temporary but complete absence in the motor cells of the hibernating animal.

Finally, while the chromatic substance of the nerve cell may be greatly diminished without the cell being necessarily in a state of pathological degeneration, it seems equally certain that when acute degeneration, in a strict sense, affects the ganglion cell, the process is usually evidenced by various forms of chromatolysis.

It would seem that we are still far from a systematized knowledge of the real pathology of the ganglion cell. No one who has not scrutinized most minutely the structure of nerve cells under most favorable conditions, can realize the difficulty of detecting changes in the reticulum and intermediate substance of these cells. Yet it is the impression gained from this study that until it becomes possible to demonstrate delicate morphological or chemical changes in this acidophile substance, the key to this branch of pathology will not be grasped.

Dr. CHARLES L. DANA said that the paper just presented was a most valuable and original contribution to the pathology of the ganglion cells, and those who had worked in that line could appreciate the amount of labor involved in its preparation. He had himself worked in this field, though not so thoroughly. He had examined the different parts of the nervous system in twenty-five or thirty cases, mostly in patients dying of alcholism, but he had not published his results in detail, for the reason that he had not been able to find in these different brains anything significant of the poison which caused death. After various trials with Nissl's stain and different fixing-fluids, he had come to the conclusion that the simplest method was the best, *i.e.*, putting pieces of fresh brain (invariably within twenty-four hours) into absolute or ninety-five per cent. alcohol, staining with methylin-blue solution and decolorizing with absolute alcohol. No aniline oil was used. His conclusions were very similar to those reached by Dr. Ewing. He had not been troubled with vacuolation at all in estimating the significance of the pathological changes. It had seemed to him that the existence of vacuolation of the cell bodies to any great extent was an indication of bad technique or of post-mortem changes. One thing which had seemed to him to indicate extreme cell degeneration or marked toxæmia was vacuolation of the nucleolus. He observed that it was noted chiefly, but not wholly, in Dr. Ewing's cases of toxæmia. One pathological picture, seen in three different cases, was an enormous pigmentation, especially of the larger cells, accompanied by chromatolysis and other signs of acute degeneration. He had seen it in two cases in which the patient died with very high temperature—as in alcoholism terminating with grave delirium and hyperpyrexia. Dr. Ewing had given beautiful pictures of the individual cell changes themselves, and they did not seem indicative of any special disease. However, one did get different pictures of cortical sections of the brain in different diseases, not so much because of any specific cell change, but because of the

general pecularities of the picture. Thus, there was a very general atrophy of the cells in old age, and in cases of morphine poisoning in which the patient had been practically starved for a considerable time. It was possible that by studying the frequency of certain kinds of cytoplasmic and nuclear changes in connection with vascular and neuroglia changes in different diseases, we might be able to find pathological pictures significant of the different types. It was along these lines that future work must be done.

Dr. IRA VAN GIESON laid stress on the necessity of studying the nerve cell in the living or fresh condition in order to gain any reliable conception of its cytologic structures and interpretations of functions of these structures, for the best-fixing reagents furnished only a deficient and distorted picture of the living cell.

This had been well exemplified in certain of his studies on fresh human material and in a study in conjunction with Mr. Rolfe Floyd, of the living neuron cell body in the ganglionated chain of the cock-roach—Blatta. In this latter instance the cell body of the neuron consisted of a cytoreticulum with rather broad meshes and a fluid of moderately thick consistence.

The anterior horn cells of the frog, when taken from the living animal, demonstrated the same structures. This fluid element of the neuron cell body or cytolymph, however, was very radically changed in its structure when subjected to the ordinary technical procedures for cytological investigation in sections under the microscope. Alcohol sublimate, acid fixing-media, Van Gehuchten's fluid, and the great majority of fixatives converted this cytolymph into a precipitate or colloidal deposit, as Held's important researches had shown.

These studies, the speaker continued, on the artificial condition of the cytolymph in the neuron cell body, when viewed under the microscope after preparation by the standard and most modern fixing-reagents, should be held in mind in investigation of the parenchyma cell of the body

in general. Most probably in the kidney and gland cells in general, the cytoplasmic granules with all their differential staining-properties was, in the light of these studies on the cytology of the neuron, merely precipitated or coagulated particles of the nucleo-albumin of the cytoplasm, which in the living cell did not exist in this form but were in solution and in a fluid form.

Nevertheless, although in sections with the very best methods of cytological technique, this cytolymph appeared in an artificial condition, with a given fixative this artificial condition was a uniform one and was the expression of a chemical reaction between the nucleo-albumins and the fixative, which was perfectly definite and constant.

Now, the artificial condition of the cytolymph of the neuron after the employment of a given fixative being an exact and uniform factor, it was, then, a reliable and exact standard of investigating pathological conditions of the neuron, and was not such a fallacy in these investigations as might seem at first glance. Pathological changes could, therefore, be studied in the neuron by observing alterations in this precipitated or coagulated condition of the cytolymph, which, although an artifact, might be made to appear as a constant standard of comparison. Yet, of course, as the auditors well recognized, there might well enough be changes of a chemical nature in this neural cytolymph, which such a plan of morphological study would fail to place in evidence. The whole question brought out the dependence of patho-logical anatomy upon physiological chemistry for the ultimate solution of most of its problems, and the impera-tive necessity of exact and conjoint investigations of the morphologist and physiological chemist in the action of fixing reagents upon the various cytologic structures, in order that we might have some notion of what we were writing about in the enormous amount of work that was being done on the cell in its hardened and artificial condition.

As to the function of these two structures—the cyto-reti-culum and cytoplasm in the neuron—the speaker, from

studies of the comparative cytology of the nerve cell, of its histogenesis, and of a variety of pathological conditions, felt justified in maintaining that the cyto-reticulum subserved the dynamic functions of the neuron. By means of this structure dendritic retraction and expansion took place. This structure, too, was the medium of conduction and transmission of nervous impulses. The cytolymph, on the other hand, was the seat of energy of the neuron. This energy of the neuron was used by the functioning of the cyto-reticulum. A certain amount of this energy residing in the cytolymph was drawn off, for instance, in the cycles of physiological activity of the nervous system, and was recovered by the elaboration of the crude food supply in the lymph surrounding the cell into higher and more complex compounds in the cytolymph. (The speaker illustrated these points by blackboard drawings.)

In considering the effects of toxic agents upon the nerve cells and in examining the effects of acute and general somatic disease upon the neuron, the speaker had been forced to accept the same conclusion as expressed by Dr. Ewing, viz., that the exceedingly irregular action of the toxic factors in effecting changes in the nerve cells could not very well be ascribed to the direct action of the toxins alone. There must be some other exceedingly important intermediary or secondary factor in producing these changes, such as vascular fluctuations or localized escapes of toxins from the vessels through lesions in the vascular endothelium.

In alluding to the form of degeneration with eccentricity of the nucleus and centralized pallor of the precipitated cytolymph granules, he said that he had studied this form of degeneration, particularly in peripheral neuritis, lead paralysis, and in cortical motor cells in general paralysis, and recognized with other observers that this form of degeneration was concomitant with lesion of the axone, and had therefore designated this degeneration as the axonal or secondary form. But he was not prepared to accept the converse of this statement, namely, that, given the appearances of this

form of degeneration in the neuron cell body, the conclusion was always to be accepted that the axone was damaged.

Dr. Van Gieson in conclusion regretted the limited time for discussion and appreciation of a paper which, in his esti-mation, was the most important which had yet been written in the new epoch of the pathology of the neuron, namely, its study in the light of modern cytology.

Dr. EWING closed the discussion, referring to the lack of specific quality in most of the changes demonstrable in ganglion cells by Nissl's method, to the significance of changes in the achromatic substance, and to the importance of Held's demonstration of the semifluid character of the chromaphilic substance, which, however, he thought did not invalidate the observations previously made upon the chromaphilic bodies.

A PRELIMINARY COMMUNICATION ON A METHOD OF DE-TERMINING THE REACTION OF POST-MORTEM MATERIAL, AND ITS APPLICATION TO NERVE TISSUE.

Dr. S. BOOKMAN read a paper with this title. He said that Held had shown that in half an hour after death the reaction of the nerve tissues became acid, and that this probably accounted for the precipitation of the Nissl gran-ules. This had suggested to him the present line of inves-tigation. The method, in brief, consisted in making an emulsion of the tissue to be examined by triturating it in a mortar with purified sand. This emulsion was then sub-jected to titration with centinormal soda, to determine the degree of acidity.

In the first experiment a piece of brain which had been in ninety-five per cent. alcohol for twenty-four hours was titrated and showed an acidity of 3 c.c. per gram. Five days later another piece of the same brain showed an acidity of the gray matter of 5.3 c.c. per gram, and of the white matter of 6.8 c.c. As, however, the alcohol seemed to exert an influence which could not be compared with changes

occurring in material not in a process of hardening, a second experiment was carried out on material not so treated, and the figures here were 5.1 c.c. per gram of white matter and · 2.1 c.c. per gram of gray matter, showing that the alcohol retarded the beginning of decomposition.

In another brain three hours after death the gray matter showed 3.1 c.c. per gram and the white matter 2.8 c.c. Eighteen hours later the gray matter showed 4.8 c.c. per gram, and the white matter 5.9 c.c. Forty-eight hours after the last experiment the gray matter showed 6.9 c.c. per gram and the white matter 5.7 c.c. Twelve hours later the whole mass showed 4.5 c.c. per gram. Thirty hours later the gray matter showed 5.3 c.c. The cord showed the following : twenty-four hours after death, 6.8 c.c. per gram ; four days after death, 4.7 c.c. per gram, having already gone over into the stage of decomposition, which was verified by decreasing acidity. Twenty-eight hours later it showed 4.4 cc. per gram.

The decrease in rapidity of the approach of reduction in acidity in the two cases was explained by the fact that the brain remained exposed at a temperature of 68° F.; whereas, the cord was kept at a temperature twenty degrees below the same.

Dr. Bookman said that he had not completed this line of research, but he thought it not impossible that he would find that each disease had a reaction peculiar to itself, and that it would explain more fully the formation of the Nissl bodies. Held had shown that by immersion in carbonate of lithium after fixation the granular areas were dissolved, while the ground matters remained intact.

Dr. IRA VAN GIESON remarked that the subject was a very promising one for study, especially in connection with the various forms of toxæmia.

Stated Meeting, March 9, 1898.

T. MITCHELL PRUDDEN, M.D., PRESIDENT.

AN ANOMALY OF THE PULMONARY VALVE.

Dr. WARREN COLEMAN presented, as an anatomical curiosity, a pulmonary artery showing four cusps instead of three. The fourth cusp was about one-third the size of the normal cusp, and was situated between the two posterior cusps. It was difficult to understand how the orifice could have been entirely closed by this anomalous valve.

ANEURISM OF THE BASILAR ARTERY.

Dr. COLEMAN also presented an aneurism of the basilar artery, which was interesting from a clinical standpoint. It had been taken from a man, fifty-four years of age. According to the history, when fifty years old he had suddenly gotten out of bed to go to the assistance of a member of his family who was ill, and had been almost immediately stricken with paralysis of the right side. He never regained the use of either the arm or the leg on that side, and contractures set in. He complained more or less constantly of headache and of pain in the right thigh. His death was preceded by coma, which gradually developed in the course of forty-eight hours. The autopsy revealed this aneurism, which measured 2 cm. in its transverse horizontal diameter, 1.5 cm. in the axis of the artery, and 1.5 cm. in the transverse vertical diameter. It was situated far forward in the artery, though apparently not involving either of the branches. On removing the brain from the skull it was found that the aneurism compressed the left crus cerebri, without affecting the spinal bulb. The symptoms, therefore, were those of interruption of the fibres in the left crus only. Death seemed to have been caused by occlusion of the aneurismal sac. The posterior communicating branches were exceedingly small, so that occlusion of this sac with a clot would deprive the spinal bulb of so much blood that death would result. The interior of the aneurism was filled with fresh clot.

Dr. WALTER LESTER CARR presented in connection with this case a specimen of aneurism of the basilar artery, which had been presented to the Society in 1891. It had been taken from a man twenty-eight years of age. He had had a fall some years previously, and there was an indefinite history of syphilitic infection. The clinical symptoms were slow pulse, slow speech, and interference with respiration. There were pains in the cervical region and convulsions.

Dr. EUGENE HODENPYL remarked that he had a specimen very similar to the first one presented by Dr. Coleman, but in his case there had been a well-marked presystolic murmur during life.

Dr. W. P. NORTHRUP thought that if the aneurism had developed slowly, like a tumor, a point would have been reached at which symptoms would have suddenly developed. He could recall at least two cases in which tumors of the brain, although growing slowly, had suddenly given rise to symptoms. In one of these cases, without warning, the patient ceased breathing. The only lesion found at autopsy was a tumor at the convexity of the brain.

Dr. C. A. HERTER said that on several occasions he had seen symptoms of an acute character develop in the course of a tumor, the ordinary symptoms of which had already developed, but he had never met with a case in which the first symptoms had been sudden in their development. It was quite a new idea to him, that an aneurism, without rupture or thrombosis, might give an acute hemiplegia as its first symptom.

Dr. PRUDDEN asked if there was anything in the morphology of the blood-vessels which would justify the belief that the suddenness of onset of the symptoms had been the result of a sudden closure of neighboring vessels not directly connected with the aneurism.

Dr. COLEMAN replied that although a very careful examination had been made regarding this point, the result had been entirely negative. With reference to the point made by Dr. Hodenpyl regarding the existence of a murmur in

the case having an anomalous pulmonary valve, he would say that his patient had been in Bellevue Hospital for a sufficient time to allow of an accurate clinical record being made, yet there had been no adventitious sound discovered about the heart.

MALIGNANT ADENOMA OF THE STOMACH.

Dr. JAMES EWING presented a growth from the pyloric region of the stomach. It had been removed from a German butcher, twenty-seven years of age, who gave a distinctly alcoholic history, and who had been emaciating and becoming anæmic for just one year, though previously healthy. There were, during this year, no gastric symptoms. Shortly after admission to Roosevelt Hospital, on December 18th, he began to complain of pain in the epigastrium, worse after eating, and had occasional attacks of vomiting. On admission he looked excessively anæmic, and was very much emaciated. He complained chiefly of dyspnœa, general weakness, and pain in the epigastrium. The physical examination was negative. The urine was 1.005, acid, and was free from sugar, albumin, and casts. The excretion of urea was always low. The temperature during the two months he was in the hospital ranged between 97° and 100.5° F. Vomiting occurred nearly every day, and increased in quantity. It never contained either red or black blood, but was usually of a yellowish color. Hydrochloric acid was absent, and lactic acid was present in considerable quantity. The blood examination, on admission, showed red cells, 1,100,000 ; leucocytes, 6,000 ; hæmoglobin, 15 per cent. Under iron and arsenic the hæmoglobin temporarily increased, reaching 30 per cent. after one month. It then steadily declined, along with a diminution of red cells and an increase of leucocytes. On account of the absence of gastric symptoms the diagnosis was at first thought to be pernicious anæmia, although the morphology of the blood did not favor this opinion, as the chief character, besides the extreme reduction in the number and great

variations in size of the red cells, was the uniform loss of hæmoglobin. No nucleated red cells were seen at any time. Toward the end there was a marked leucocytosis. After about six weeks a slight tumor was detected in the region of the pylorus, and at this time the vomitus resembled that from a dilated stomach. Masses of hæmatoidin, as well as shreds of the epithelial tumor, were discovered microscopically in the vomitus, which chemically had always shown absence of hydrochloric acid and presence of lactic acid. At the autopsy there were noted a small tuberculous cavity in the left pulmonary apex, adherent pericardium, marked fatty degeneration of heart muscle and liver, double ureter on right side, and a large ulcerating tumor of the pyloric region of the stomach, with firm posterior adhesions. The tumor involved the entire circumference of the pylorus, which was almost occluded, and extended irregularly over the pyloric end of the stomach for a distance of three or four inches. Its surface was very irregular, fungating in places, and deeply necrotic. The edges were moderately raised, but not very dense. The stomach was greatly dilated, and contained two quarts of dark fluid of the microscopical and chemical characters noted in the vomitus. No metastases were discovered. The periportal lymph nodes were involved in the adhesions, but no others seemed to be affected. The microscopical diagnosis was malignant adenoma of the stomach.

Dr. EWING said that the case was interesting: (1) because of the occurrence of this form of cancer in a patient so young; (2) because of the marked resemblance clinically to pernicious anæmia; and (3) because of the characteristic appearance of the vomitus toward the end of the disease. There were very few reported cases of malignant adenoma in patients of this age. The microscopical examination showed that the type of adenoma was much better preserved than usual.

LEUKÆMIA.

Dr. EWING also presented fresh specimens from a case of

leukæmia. They were taken from a child of eleven years who was known to have had the disease for at least four years. The blood was distinctly that of a myelogenous leukæmia, the largest percentage of white cells being myelocytes. The case had been under clinical observation for some years. In comparison with the weight of the child, the liver and spleen were excessively enlarged. On section, the liver showed the portal canals infiltrated with new cells. The enlargement of the internal lymph nodes was a very prominent feature. The lungs showed small areas of fresh pneumonia and some areas of leukæmic infiltration. The heart was very considerably hypertrophied, and contained a characteristic leukæmic clot on the left side. The marrow of the sternum was extremely cellular, and of a much lighter color than normal.

Dr. HARLOW BROOKS said that three years ago there had been at Bellevue Hospital a case that had been diagnosed as pernicious anæmia after having been under observation for about three months. The clinical diagnosis had been verified by several blood examinations. At the autopsy he had found a typical malignant adenoma of the stomach situated in the region of the pylorus. Whether it simply happened to occur in connection with the anæmia, or whether the blood examinations had been deceptive, he would not say, but he found it hard to believe the latter, as the examinations had been conducted by several well-known laboratory experts.

Dr. JOHN H. LARKIN said, regarding the right kidney from the case of adenoma of the stomach, that in addition to the double ureter he had discovered in the same kidney a small tumor which, upon microscopic examination, proved to be an adenoma of the kidney.

Dr. EWING said that he had paid considerable attention to the character of the blood in this disease, and had yet to see a case of malignant disease of the stomach in which the blood was distinctly that of pernicious anæmia. It often resembled the blood of pernicious anæmia, though present-

ing distinctive characters of its own. These distinctive features were principally two, viz.: (1) The loss of hæmoglobin in the cells; and (2) the behavior of the leucocytes. In every case of ulcerating carcinoma of the stomach that he had seen, except in the one just presented, there had been, from the first, distinct leucocytosis. As a rule, the leucocytes were very much increased in carcinoma of the stomach, and were quite uniformly diminished in pernicious anæmia. Microscopical specimens were also exhibited.

AN EXPERIMENTAL STUDY OF THE TOXIC PROPERTIES OF INDOL.

Dr. C. A. HERTER read a paper with this title, giving the results of his experiments on the lower animals and in man. He said that indol was produced in some quantity in the intestine, and was oxidized in the organism into indoxyl, which, in combination with sulphuric acid, formed the basis of the well-known indican or indoxyl reaction of the urine. Indol crystallized irregularly, had a melting-point of 52° C., volatilized readily, and possessed a characteristic fecal odor. It was produced by a considerable variety of bacteria, both pathogenic and non-pathogenic—e.g., the colon bacillus, typhoid bacillus, cholera bacillus, vibrios, etc. The indol used in these experiments was obtained from the putrefaction of large quantities of pig's fibrin. Indol underwent an important change within the organism, being first oxidized into indoxyl, and then changed into the sulphuric-acid salt of indoxyl. It was as indoxyl sulphate of potassium that the indoxyl formed within the organism left the body in the urine. When indol was injected in large quantity into the blood it soon disappeared and could not be recognized; yet the addition of a few drops of indol to a considerable quantity of blood outside of the body gave a different result, the indol being very readily recovered by distillation. This showed that the organism possessed the power of converting the indol very rapidly into some other body. It seemed probable that the main factor in the production of indol in the

intestine was the presence of the colon bacillus. The common colon bacillus ordinarily produced indol when acting on proteid media. Indol in the intestine was transformed into indoxyl after absorption, and subsequently to indoxyl potassium sulphate. The indoxyl of the urine was convertible by oxidation into indican. The experiments detailed in the paper were directed to the investigation of : (1) Acute indol poisoning in rabbits and dogs ; (2) chronic poisoning in rabbits ; and (3) the effect of indol when taken into the stomach of human beings. It was found that intravenous injections of indol exerted marked toxic effects on the nervous system in dogs and rabbits, producing cardiac and respiratory depression, general prostration, marked contraction of the pupils, irregular clonic spasm, and increased reflex excitability, including increase in the activity of the knee-jerks. When fatal doses were injected the cause of death in every instance seemed to be cardiac, rather than respiratory, failure. Injections into the intestine caused more marked effects on the nervous system than intravenous injections. Small quantities of indol, when administered subcutaneously every day, caused profound disturbances of nutrition, and caused death in a few weeks. The immediate cause of death in chronic indol poisoning was not clear. The chief alterations were found in the liver, the capillaries of the lobules being much congested and the liver cells the seat of pigmentation. In marked contrast to the rabbits was the behavior of a monkey. A small monkey of about the same weight as the rabbits was scarcely affected by small doses of indol given for two weeks. In order to determine the effect on the human subject, three healthy men were given indol in increasing doses, beginning with 0.1 gm. in capsules immediately after meals. The first subject experienced slight frontal headache, and then colic, followed by diarrhœa. This was probably owing to the rather large doses of indol, as he received 0.5 gm. of the indol. He was entirely well the next day. The doses of indol which were sufficient to cause symptoms in the first case had no effect

on the second man, and it was only when large doses—1 gm.
or more—were administered that symptoms were produced.
These were, extreme insomnia and unnatural mental
activity, and, toward the last, frontal and occipital headache.
The third subject had frontal headache the greater part of
the time, and some dizziness toward the end of the experi-
ment. The knee jerks were increased. The symptoms
wore away on discontinuing the indol. On a second trial,
five days after the completion of the first, and under rather
larger doses, the original symptoms returned. A third trial
was made, extending over a period of eight days. In this
experiment marked headache was noted only once, but
there was an almost continuous sense of discomfort in the
frontal region. The most prominent feature was the exces-
sive lassitude. The urine gave no indol reaction before
and after the experiment, but it was marked during the
administration of the indol.

Dr. HERTER then took up the consideration of the clinical
significance of excessive indol production in the intestine,
and its excessive absorption, as shown by a strong indol re-
action in the urine. He said that the first difficulty en-
countered was the absence of a satisfactory normal standard,
as many persons had the indoxyl reaction constantly present
in the urine. One should be cautious about concluding that
the frontal headache was due to the indol absorption, al-
though it was probably so produced in very exceptional
instances. In the experimental cases the frontal headache
was cleared up by out-door exercise. One might perhaps
find in these experiments an explanation of the headaches
and sensations of discomfort in the head observed in many
persons suffering from constipation. The most important
factors in determining individual susceptibility to indol
were: (1) The character of the nervous system; and (2) the
ability of the organism to transform indol into less toxic
substances. It would seem from the observed effects of
indol, taken in conjunction with the study of the clinical
conditions in which the indoxyl reaction was markedly

increased, that we are justified in believing that prolonged and excessive indol absorption was capable of causing frontal headache, abnormal cephalic sensations, and indisposition to mental and physical exercise. If prolonged, the latter might form the basis of a neurasthenic state. While we could not regard indol as an indifferent substance, we could not, on the other hand, regard it as a highly toxic one.

Dr. S. BOOKMAN said that his experience seemed to show that indol was formed during pancreatic fermentation. He would like to know whether any gas analyses of the blood had been made to determine whether the oxidizing coefficient had undergone change in cases in which indol had been administered, and also whether the improvement observed from exercise might not be due to the absorption of oxygen and more active metabolism, with oxidation of the indol itself. It had occurred to him that it was possible that the potassium in the indoxyl potassium sulphate, when given in large doses, might be responsible for some of the prostration noted.

Dr. EWING said that the paper gave much more definite information on this subject than he had been able to obtain elsewhere. Personally, he had experienced difficulty in applying the ordinary clinical test for indican, as it was very easy to add an excessive amount of the oxidizing agent. For this reason he desired further details regarding Dr. Herter's method of making this test. He also asked about the frequency and grade of indicanuria in albuminous putrefaction in other parts of the body than the intestine.

Dr. BOOKMAN said that in applying the indican test he had found that a fifteen-volume solution of hydrogen peroxide and strong hydrochloric acid acted very uniformly and satisfactorily.

Dr. HERTER said that he agreed with Dr. Bookman that it was not unlikely that the influence of exercise in clearing up the headache was dependent upon increased oxidation, but he did not think the potassium salts, under the circumstances, would be likely to exert any influence in rendering

indoxyl more toxic than it had been previously.   It should be noted that in his experiments the indol itself had been introduced, and not the potassium salts.   He had made no gas analyses, and his reading of the literature had led him to believe that this method was likely to introduce many errors.   Undoubtedly indol is produced under the influence of the pancreatic ferment on proteid material, but it may arise in the absence of pancreatic juice, or even if the duct be tied.   When large numbers of colon bacilli are introduced into the intestine below the point at which the pancreatic juice enters the gut, as he had done, there would be found to be a very rapid increase in the indoxyl in the urine.   It was reasonable to attribute this, chiefly at any rate, to the action of the colon bacillus.   As to the method of applying the indican test, he would say that he had met with the dif-ficulty referred to by Dr. Ewing, and had found that this could be largely avoided by using a 0.5-per-cent. solution of ferric chloride in concentrated hydrochloric acid, mixing an equal volume of this and the urine, and then shaking out with chloroform.   The putrefaction of proteids in other parts of the body was capable of giving rise to very strong indoxyl reaction in the urine.   Cases in which abscesses had been opened had given a strong indoxyl reaction in the urine, and indol had been found in appreciable quantities in the abscesses themselves.   As to the relationship between neur-asthenic states and excessive absorption of indol, he would say that of thirty-two cases presenting the clinical characters of neurasthenia, twenty-one gave a strong indican reaction in the urine, and eleven a slight reaction or none at all.

THE REPORT OF A CASE OF ACROMEGALY, WITH SPECIMENS, AND OF A CASE OF HEMORRHAGE INTO THE HYPO-PHYSIS CEREBRI.

Dr. PEARCE BAILEY read this paper.   He said that there were now on record thirty microscopical examinations, with autopsies, but many lacked descriptive detail, and there were many notable discrepancies in the reports.   It had

been ascertained that the pituitary body is regularly diseased, usually in its anterior portion, that the thyroid is usually enlarged, sometimes atrophied, very rarely normal, and that the thymus is occasionally persistent or enlarged. The most constant visceral lesions were those of the pituitary and thyroid. The case reported was that of a woman, sixty-five years of age, who had been in good health up to five years before death. Then the hands and feet became enlarged and the seats of pain, extended up the limbs. There was no loss of muscular power at that time, and until her last illness she could walk and use the hands. The urine was albuminous, but there was no œdema of the extremities. Her death followed shortly after the sudden development of symptoms of uræmia and pulmonary congestion. The autopsy was made twenty-four hours after death. There was an extensive growth of hair on the face ; the chin was prominent ; the bridge of the nose was widened ; the heart was moderately hypertrophied, but there was no valvular lesion : the muscular tissue was soft ; there were acute congestion and œdema of the lungs, and the kidneys were the seat of chronic diffuse nephritis. The liver was normal. The cerebral dura was adherent to the skull and the pia mater was slightly thickened anteriorly. The brain weighed 1,284 gm., or about 72 gm. in excess of the usual weight. There was no gross deviation in the form of the convolutions. Examination of the ganglion cells by Nissl's method was negative. A mass of tissue occupying the position of the thymus was removed, but the microscope showed none of the thymus remaining. The thyroid weighed 84 gm., instead of 29.3 gm., the average normal weight. Its surface was firm and smooth, and on section a white, viscid fluid exuded. There was a number of small cysts. The gland substance proved, on microscopical examination, to be generally normal. The pituitary body was very much larger than normal, weighing 8 gm., instead of 0.6 gm. It was red and very soft, and the contents were whitish and semi-fluid. Sections showed three distinct portions, united by a common capsule.

These portions were: (1) The smallest, or posterior lobe, which was somewhat more cellular than normal; (2) the middle portion or glandular lobe, the chief characteristic of which was its vascularity; and (3) the anterior portion, composed of fibes and cells, with deeply staining nuclei. In other words, there were a pituitary body and an outgrowth from its anterior lobe. The tumor might be regarded as an adenoma.

The second case reported was that of a male, fifty years of age, who was admitted on February 13, 1897, to St. Luke's Hospital, to the service of Dr. Van Horne Norrie. The patient was comatose on admission, and died within twenty-four hours. He had been moderately alcoholic, and for several years previously had had paraesthesiæ of the lower extremities and back. Shortly before admission he had complained of impairment of vision and pain under the eyes, and later there were nausea, vomiting, and blindness. He lay on the left side almost continuously; the pupils were moderately dilated; there were paralysis of the internal rectus and ptosis on the right side. There was no other paralysis and no optic neuritis. At the autopsy, there was no external evidence of acromegaly. On examining the brain, a high degree of endarteritis of the basilar artery was noted. Occupying the sella turcica and projecting about 3 mm. above it, was a mass which, on microscopical examination, proved to be the encapsulated pituitary body enlarged to three or four times its normal size. An extensive hemorrhage had taken place in it. There was an endarteritis of many of the small vessels in this mass. The parenchymatous hypertrophy of the pituitary body must have antedated the hemorrhage. The latter was the result of rupture of some of the diseased vessels in the pituitary body. The speaker said that it was possible that this case represented an early state of acromegaly.

Stated Meeting, April 13, 1898.

T. MITCHELL PRUDDEN, M.D., PRESIDENT.

ANEURISM OF THE ASCENDING ARCH OF THE AORTA.

Dr. HARLOW BROOKS presented three cases. The first one was that of a man, seventy-five years of age, who had been brought into the hospital in a moribund condition. The body exhibited the usual senile changes, and the arteries were atheromatous throughout. In the ascending arch of the aorta, at the point of origin of one of the coronary arteries, was a sacculated dilatation. The general condition of the heart was fairly good for one so old. The kidneys showed chronic diffuse nephritis.

The second case was that of a woman who had been admitted to Bellevue Hospital with a history of alcoholism and of acute articular rheumatism five years before. Three months before admission she began to have shortness of breath on going up and down stairs. Swelling of the feet and shortness of breath were her chief complaints on admission. She died very shortly after entering the hospital, so that no physical examination was made. The pericardium was injected and greatly distended. The heart was enormously enlarged, weighing twenty-eight ounces. Its walls were flaccid and relatively thin, showing recent dilatation. The cavities contained post-mortem clot. The general arterial trunks showed very little disease. In the arch of the aorta, just above the sinuses of Valsalva, was found a foramen, about 1.2 cm. in diameter, bifurcated by a column of tissue, about 1 mm. thick. This led into a cavity, measuring 3 cm. in diameter. The sacculation so produced was completely enclosed in the thin walls of the right auricle.

The third case was that of a man, forty-four years of age, who entered the hospital complaining of shortness of breath and cough. Fourteen years ago he had rheumatism, and had had numerous attacks since that time. During all the subsequent years he had had more or less shortness of

breath.   For the last six months there had been constant
cough without expectoration, and at the time of his entrance
into the hospital there were slight œdema of the lower
extremities and pain in the upper part of the back.   The
physical examination revealed an extreme degree of pul-
monary emphysema and a diffuse systolic and diastolic
murmur over the lower portion of the manubrium of the
sternum.   The pulse was small, equal, regular, rapid, and of
considerable volume.   The liver was apparently increased in
size.   At the autopsy the heart was found to be enlarged,
weighing sixteen ounces.   In the right cavity was some
fluid blood, and there was considerable interstitial change,
especially in the papillary muscle.   There was considerable
thickening of the aortic and mitral valves.   In the ascend-
ing arch of the aorta, just below the innominate artery, was
still another sac, which had ruptured through the walls
of the aorta, and had made a wall for itself, consisting of
the external wall of the trachea and of the adhesions exist-
ing between the trachea and the transverse arch of the
aorta.   This sac was lined by recent granulations.   The sac
was not occluded by clot, and did not contain even post-
mortem clot.

A NEW METHOD OF OBTAINING BLOOD DURING LIFE FOR BACTERIOLOGICAL EXAMINATIONS.

Dr. WALTER B. JAMES exhibited a small instrument
which he had been using at the Presbyterian Hospital dur-
ing the past year for this purpose.   He said that previous
attempts to obtain cultures from the blood had been more
or less disappointing, because of the varying results of differ-
ent observers.   Thus, one observer had examined nine cases
of typhoid fever, and claimed to have obtained the specific
organism in all of them, while another investigator exam-
ined fourteen cases and found it in none.   These differences
in results were apparently largely due to the method
employed.   One method was to use sterilized glass bulbs,
having tapering points, which when the ends were broken

off were thrust forcibly into the vein. The results were accurate enough, but this method was so uncomfortable and dangerous that it had not been much used in this country. A sterilized hypodermic syringe had been used by many, but it was difficult for the physician to keep it properly sterilized. The method which he was about to describe, and which had been used with satisfaction at the Presbyterian Hospital, had three objects in view, viz.: (1) to render the procedure as nearly as possible absolutely sterile ; (2) to make it absolutely safe and not too uncomfortable for the patient ; and (3) to have it sufficiently simple to be available for the house-staff of a hospital or for general practitioners. Some small glass tubes were drawn to a taper, and each one was fitted · with a hypodermic needle. The end of the tube was stopped with cotton. A number of these tubes could be sterilized by dry heat, and kept in stock ready for use at a moment's notice. Experience seemed to show that no elaborate preparations for disinfecting the skin were necessary. The practice had been to thrust the needle into the vein at the bend of the elbow. The tube would ordinarily be almost filled by the venous blood pressure, but if necessary gentle suction might be made with the mouth. The tube was then withdrawn and the blood forced out by the breath on to suitable culture media. From examinations made in one hundred and sixty cases, representing many different diseases, and from a study of literature on the subject, the conclusion had been reached that blood culture experiments, as ordinarily made, from puncture of the tip of the finger, were absolutely worthless. In a fair proportion of the cases of typhoid fever at the Presbyterian Hospital the specific bacillus had been found, and in a fair proportion of cases of sepsis, showing general pyæmia, a culture of the streptococcus had been obtained from the blood. In two out of three cases of endocarditis in which cultures were made from the the blood, in a case due to infection with the pneumococcus lanceolatus, this bacterium was repeatedly obtained.

Dr. R. H. SAYRE asked if any experiments had been made,

following out those of Dane, of Boston, regarding blood in cases of tuberculosis associated with abscesses, with a view to determining if possible when the case became a mixed in-fection and when it was simply tuberculosis.

DR. JAMES replied that they had examined a dozen or more cases of tuberculosis in which there was thought to be mixed infection, but the streptococcus was not found in any of them.

Dr. W. H. PARK said that for the past year the workers in the laboratory of the health department had been endeavoring to get results from streptococcus serum, and the chief difficulty had been to get blood free from contamination. The literature of the subject showed that streptococcus serum had been not infrequently employed when the blood examination showed only the staphylococcus present.

Dr. JAMES EWING thought that some such simple apparatus as that just described would greatly facilitate the more general examination of the blood. The apparatus was certainly very simple and easily sterilized, and hence was in that respect superior to any aspirating syringe. But on the end of the glass tube were connections for a hypodermic needle, necessitating the same sterilization as for the aspirating syringe. On the other end was a cotton pledget, through which he supposed the blood was aspirated by the mouth. Unless the cotton pledget was left in, he thought there would be great liability of contamination. Another objection to the instrument was that it did not have sufficient capacity; one cubic centimetre was hardly enough—at least five cubic centimetres should be obtained and planted on different media. The larger the quantity of blood, the greater the chance, in cases of mild infection, of securing the particular germ which was in the circulation. He had found a hypodermic syringe a satisfactory instrument, except that it was somewhat difficult to sterilize. With it, five cubic centimetres could be obtained without trouble. He had not found great difficulty in sterilizing the syringe with a ten-per-cent. formalin solution, the syringe being kept filled with it. Just before being used, the syringe should be washed

out thoroughly with boiled water. He had not experienced any great difficulty in getting into the vein, except in moribund patients, and in these by the application of a tourniquet for a few moments sufficient blood could be obtained. A vertical puncture was better than a longitudinal thrust. The advantage of using a large quantity of blood had been well shown in the series of observations on diphtheria made by Wright. By using a larger quantity of blood he had obtained the diphtheria bacillus in a considerable percentage of severe cases. Personally he had failed to get the streptococcus in fatal cases of malignant endocarditis, even when five cubic centimetres of blood had been subjected to examination.

Dr. JAMES said that, of course, the instrument could be made larger, but he had thought it better not to use too much blood, for fear that there might be some bactericidal action set up. The method of cleansing the hypodermic syringe described by Dr. Ewing was of course satisfactory, but these details would not be carried out by many in general practice. His tubes could be kept in stock absolutely sterile. In not one of the cases examined was there any local reaction whatever, and none of the patients complained any more than they would of an ordinary hypodermic injection.

A CASE OF HEMORRHAGIC DISEASE OF THE NEW-BORN, WITH A BACTERIOLOGICAL EXAMINATION.

Dr. ELIZABETH MERCELIS reported a case of this kind. She said that at the New York Infirmary for Women and Children, from February 25 to April 20, 1897, there had been nine cases in which hemorrhage had occurred in the newborn. In three it had been multiple and severe, and all had been fatal. In three others it had been multiple and slight, and of these one had been fatal. In two of the infants, who were small and frail, there had been hemorrhage from the nose only. One of these children died. Some of these cases were slight, and occurring independently would have

been disregarded. Six of the nine cases were in male children. The mortality in the whole series was 55 per cent. Two of the more marked cases were made the sub-ject of special study. The first of these cases developed hemorrhagic swellings, which ruptured spontaneously. Cul-tures were taken from the finger before death, which oc-curred on the thirteenth day. The cultures remained sterile. The autopsy showed extensive cutaneous and subcutaneous hemorrhages, extending from ear to ear and from the maxilla to the clavicle. On the left side was a sloughing area, with an opening, three centimetres in diameter, which exposed the external jugular vein. No point of rupture of the ves-sel could be detected. The skin of the hands and feet was tough, leathery, and almost black. The umbilicus was nor-mal. The thoracic and abdominal organs were congested, but there were no hemorrhages. The heart showed slight vegetations. Cultures taken from the liver and kidney were planted on agar plates and on broth, but no growth resulted.

In the second case there were hemorrhages from the bowel, stomach, and uterus, and death occurred on the sixth day. The autopsy showed petechial spots on the right arm and chest. The umbilicus was normal, and the cord was still adherent. The lungs were congested posteriorly. The tricuspid and mitral valves of the heart exhibited vegetations along the edges ; the foramen ovale was almost closed. The liver was fatty. The spleen was very much congested. The kidneys showed no special congestion and no hemorrhages. The pancreas, adrenals, and thymus were negative. The stomach was pale, and there were no hemorrhages or ulcer-ations. The intestine throughout was filled with dark red-dish, tarry material showing blood. There was slight en-largement of the isolated follicles of the colon, but there were no other changes in the mucosa. About the ureteral openings in the bladder were elevated hemorrhagic areas. The uterus was filled with fluid blood ; the adnexa were neg-ative. The brain showed moderate congestion of the me-

ninges ; there were no hemorrhages in the ventricle or basic ganglia.

Cover-slip preparations from the different organs in the second case showed several large and small cocci, without a definite capsule, which stained more or less, and were scattered in groups, pairs, or short chains.   The cocci were often oval, and here and there a distinct bacillus form was seen.   Agar plates from the liver, spleen, and inferior vena cava showed no growth after twenty-four hours.   The broth tube from the heart's blood was uniformly cloudy.   The agar tube from the uterus showed a continuous delicate whitish growth along the line of puncture, but no surface growth.   That from the kidney had a slight growth below the surface.   Preparations from these gave an organism vary- ing much in size, shape, and intensity of staining, as de- scribed ; bipolar staining was common.   It was examined on various culture media, but whatever the medium the growth was always delicate and did not increase after twenty-four or forty-eight hours.   There was no growth in gelatin. When broth was inoculated directly from an animal, a growth occasionally occurred—rarely otherwise.   When one-fourth to one-eighth centimetre of hæmoglobin was added to the broth, or a decinormal solution of KOH, until the media were quite alkaline, a growth in aërobic and anaërobic cultures took place.

In glycerin-agar the development was more noticeable along the puncture, but there was none on the surface.   In blood serum there was a colorless surface growth.   Ascitic fluid seemed to be the most favorable medium ; here the clouding was general.   Milk, after twenty-four hours, became slightly acid, and after forty-eight hours coagulated.   The normal limit of viability of the organism was from two to four days.   When one and one-half cubic centimetres of an ascitic fluid culture was introduced into the peritoneal cavity of a pig, death resulted in twenty-one hours.   There were marked subcutaneous œdema and an accumulation of a moderate amount of turbid fluid in the peritoneal cavity.

The heart, liver, and kidneys were negative. The intestine, spleen, and uterus were congested, but contained no hemorrhages. There were no hemorrhages in the lungs. Cover-slip preparations gave the same pictures as already described. In the cultures from the liver and heart the growth took place below the surface.

The microscopical appearances found in rabbits and other animals inoculated with this organism were as follows: The liver showed engorgement of the vessels, degeneration of the liver cells, and fragmentation of the nuclei. In the rabbit, small hemorrhagic areas were found. The spleen was much congested. The pancreas showed an area of free blood in the tissue. A cross-section of the ventricle of the heart of the pig showed an absence of the endothelium over one-fifth of the wall and a few diplococci in short chains. Certain areas in the lung of the rabbit showed the alveoli to be filled with blood and epithelium. Except in the lungs, the effused blood was not to be distinguished from congestion by the naked eye.

Morphologically, the organism at times suggested the pneumococcus lanceolatus or the bacillus of Friedlander, but was distinguished from them by culture peculiarities, some of which had been already mentioned.

In conclusion, Dr. Mercelis expressed her indebtedness to Dr. W. H. Park for the privilege of working in the laboratory of the Board of Health, and to Dr. Anna Williams for verifying the results.

EPITHELIOMA OF THE ŒSOPHAGUS WITH INVOLVEMENT
OF THE TRACHEA AND SUBCLAVIAN VEIN.

Dr. JOHN H. LARKIN presented a specimen of this kind, removed from a man, fifty-four years of age, who had always been well up to two months ago. About that time he began to grow pale and weak. At the time of his admission to hospital, two weeks before death, there were some cough and considerable dyspnœa. Physical examination gave the typical signs of bronchitis and

emphysema. With the exception that the heart action was irregular and the sounds were muffled, the other viscera were normal. The urine contained no albumin, and no tubercle bacilli were found in the sputum. The case was treated for chronic bronchitis and emphysema and anæmia. The dyspnœa became very distressing, but there was no noteworthy change in the man's condition up to just before his death, which occurred very suddenly. The autopsy was performed four hours after death. The body was well nourished, but exceedingly pale. There were no evidences of peritonitis. The lungs were extremely emphysematous. The liver was exceedingly pale. Behind the manubrium of the sternum was a large firm mass, about the size of a small orange, in front of and to the left of the trachea, and behind and above the arch of the aorta. In the œsophagus was a small papilliferous tumor, about 15 cm. above the cardiac end of the stomach. It measured 2 cm. longitudinally, 1.5 cm. transversely, and 1 cm. from base to apex. About 4 cm. above this tumor were two small, irregular ulcers, probably the result of pressure. The lumen of the trachea was narrowed to a mere slit. The mass lay chiefly to the left of the trachea, extending from the arch of the aorta to the suprasternal notch. The great vessels lay in front, and the tumor mass was rather firmly wedged between the manubrium and the spinal column. The cross-section of the tumor measured 6 cm. antero-posteriorly, and 5 cm. laterally. About 2 cm. above the bifurcation of the trachea the mass protruded into the lumen. The left sub-clavian vein was adherent to the top portion of the tumor, and two small nodular masses were found projecting into its lumen.

Microscopical examination showed the tumor to be an epithelioma, Fig. 1 which was undoubtedly primary in the œsophagus, and extended directly around the trachea and subclavian vein.

The points especially emphasized were: (1) The smallness of the primary growth and the extent of the growth around the trachea ; (2) the penetration of the subclavian
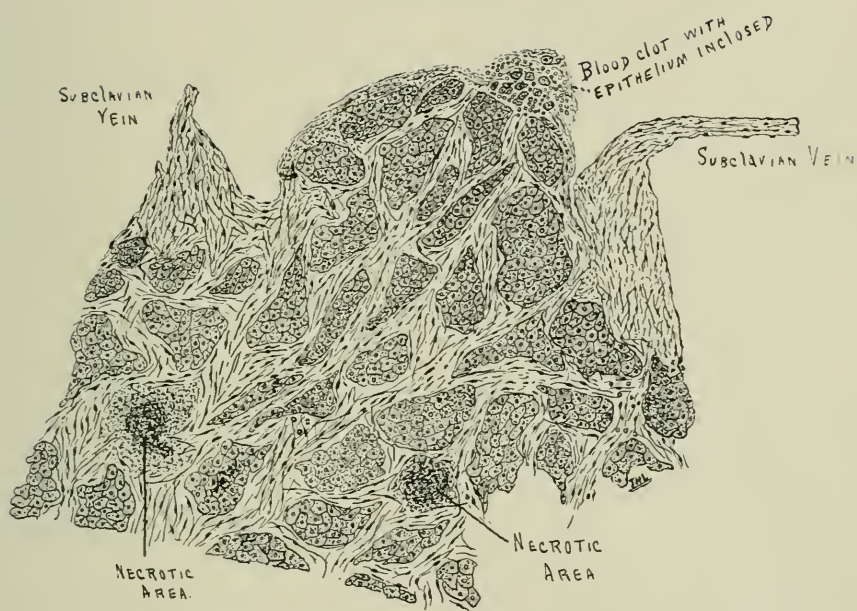
Microscopic Section of Epithelioma Perforating Subclavian Vein.

vein by direct extension and the possible mode of dissemina-
tion of metastases by the blood; (3) the mildness of the
symptoms compared with the grave post-mortem findings;
and (4) the fact that the sudden death was due to mechanical
asphyxia.

Dr. Prudden remarked that examination of the sections
was interesting, because over the epithelioma growing into
the vein was a thin pellicle of fibrin which had bound the
loose epithelial cells in place against the wall. Certainly the
loose cells would have been in contact with the flowing
blood except for this protection.

A SARCOMA OF THE LEG OF SLOW GROWTH.

Dr. R. H. Sayre presented a skiagraph of the leg of a
boy of seven years, who when eighteen months old fell,
striking the crest of·the tibia and producing a slight abra-
sion. A little nodule appeared shortly afterward, and some
months later it was incised and scraped out. The wound
healed, but the leg was somewhat crooked. He then had
another fall. Subsequently another surgeon made a long
incision and removed a large quantity of soft material and
packed the wound. The boy was kept off his feet for about
a year, yet the leg began to bend. Finally he broke the leg.
The case came under Dr. Sayre's observation last fall, and
an operation was advised but not consented to. When seen
again quite recently the boy had a temperature of 99.2° F.
The skiagraph showed a peculiar soft condition of the bone.
On operation for the purpose of removing a wedge-shaped
piece of bone, the bone was found to be soft like sponge.
It bled quite profusely, and the appearance suggested syph-
lis or malignant disease. The operation was extended until
fairly healthy looking bone was encountered. On decalcifi-
cation of the removed bone it was found to be a spindle-cell
sarcoma, and amputation was performed. The bone had
made no effort at repair. It was remarkable that the dis-
ease should have lasted six years without giving rise to
metastasis.

A METHOD OF RECORDING ANATOMICAL DATA AND THE
RESULTS OF SPECIAL OBSERVATIONS AND RESEARCH
IN LABORATORIES, COLLEGES, AND HOSPITALS BY THE
APPLICATION OF THE CARD-CATALOGUE SYSTEM.

Dr. HENDERSON B. DEADY read a paper on this subject
and gave a demonstration of the method as used in the
Pathological Institute of the New York State Hospitals.
He said that the record of a case could be considered in
three divisions, viz. : (1) The autopsy notes, history, and date
of accession ; (2) the data relating to preservation ; (3) the
subsequent work relating to the slide and its technique.
The old form of case book, he said, was discarded, and the
data of accession were entered in the " accession book "—
an adaptation from the library accession book which was
considered the keystone to all the systematized laboratory
work.   In this book were entered : (1) The accession num-
ber ; (2) the date on which the case was received ; (3) the
name of the patient or specimen ; (4) its source, *e. g.*, hospi-
tal ; (5) the clinical diagnosis ; (6) the date of death ; (7)
the date and hour of autopsy ; (8) a reference as to the
receipt of autopsy notes and history.   The history and au-
topsy notes were kept in a separate book, typewritten on
paper of uniform size, bearing the accession or case number,
which the case got from the accession book.   The slide
labels were small squares divided by two horizontal lines
into three spaces.   On the first line was placed the accession
number, followed by a decimal point.   The number which
immediately followed the decimal point was any unit from
1 to 9, and represented an arbitrary but convenient anatom-
ical classification of the material.   The pieces from the
material as it was divided for preservation were all num-
bered, and these numbers followed the classification number
in regular order.   Thus, 871.13 meant case No. 871, and the
third piece of the brain, the figure " 1 " immediately follow-
ing the decimal point meaning in the anatomical classifica-
tion " brain and its membranes."   Pieces taken from a

specimen after preservation were numbered consecutively. The number was written on the second line (this the speaker called the block or distribution number). The slides made from this piece were also numbered consecutively and the number was written on the third line. All the notes of preservation were kept on cards, one card for each specimen. In this card catalogue was also kept a memorandum of the pieces " distributed." Each worker had one card for the piece assigned to him, called a block card. On this were written the complete number describing the piece and the notes of technique referring to the piece from the time he received it. In the same way he filled out a card for each slide made from this piece, and the card bearing the full number and notes of technique. The same system was applied to drawings made from material in any of these three phases. The drawing bore the number of the specimen, and a colored card bore the number, drawing, technique, and delineator. By this system each piece of material, the notes referring to it, and drawings were indexed, quickly put away or referred to, and were made permanent records of the laboratory, accessible and intelligible to any one for all time — the material in all stages bearing the number only, the data being on cards bearing the same number.

Dr. D. H. MCALPIN inquired as to the relative expense per thousand cases, the number of clerks required to maintain the system, and also whether a fireproof safe was provided for these important records. The system, he said, would not be found to be at all complex as soon as one had become thoroughly acquainted with it. In different laboratories there were somewhat similar systems, though smaller and less pretentious. At the Carnegie Laboratory the cost was less than two cents each for a complete record of cases.

Dr. FREDERICK S. WARD spoke of the system employed at the Pathological Laboratory of the College of Physicians and Surgeons. The record of a case, he said, made use of an accession book, a book of complete records, a card index to

anatomical material, and a cross-reference card index to material and slides. In the accession book were recorded the number of the specimen, date of receipt, name of patient or specimen, source, clinical diagnosis, date of autopsy or operation, by whom the autopsy or operation was performed, anatomical diagnosis, collection number, references, and remarks. The first eight of these items were made when the specimen came to the laboratory and the last three when the necessary data had been obtained. In the book of notes were recorded the foregoing items, together with the full clinical history, macroscopic and microscopic examinations, and references to slides and literature. The card index of material presented the accession number, source, diagnosis, preservation of material, reference to slides, etc. The cross-reference catalogue was one of organs and lesions, referring both to material in the collection and to slides in the cabinet. The slides were filed away and indexed according to systems and subdivisions of these systems. For instance, there were the alimentary and genito-urinary systems, tumors, etc., as the main division, with subdivisions of organs and varieties of tumors. The initial letter of the system to which the slide belonged was printed in red; and others, when required, of the subdivision in which it fell were printed in black, together with the number of the slide, the latter being the reference to the slide. Every specimen coming to the laboratory was recorded in the accession book, receiving therefrom the accession number, examined, and then met one of three destinations: 1. It was thrown away; 2, saved for gross demonstration before the class; 3, placed in the laboratory collection. In the latter case it carried its accession number to the card index and to the book of notes. A specimen having received a collection number, this was borne on jar label, record, all reference cards, and slides.

Dr. FRANCIS C. WOOD exhibited the cards used to index the histories in St. Luke's Hospital. Cards of different colors, he said, were provided for male and female patients.

The large cards with little tags on the top were indexed according to diseases and the tags referred to the attendant treating the case, so that each could, with very little expenditure of time, pick out the patient who had been under his care.   The small cards were used to index the patients by name.   Pathological reports were indexed on a card of a special color.   On all these cards were given the volume and page of the history book in which the record of the particular case could be found in full.

The following " card " specimens were also exhibited:

ADVANCED CIRRHOSIS OF THE LIVER WITH MARKED ATROPHY OF THE RIGHT LOBE AND COMPENSATORY HYPERTROPHY OF THE LEFT LOBE.

Dr. EUGENE HODENPYL presented this specimen, which had been removed from a man who died of pulmonary œdema, and who suffered for a number of years from frequent and profuse epistaxis.   No other symptoms referable to the liver were observed until a few days before death, when slight jaundice and anasarca developed.

SACCULATED ANEURISM OF THE ARCH OF THE AORTA, SHOWING A LARGE PERFORATION ON THE POSTERIOR ASPECT, AND A SMALLER PERFORATION INTO THE ŒSOPHAGUS FROM WHICH FREQUENT HEMORRHAGES OCCURRED.

Dr. Hodenpyl also presented this specimen which had been taken from a man, fifty-five years of age, formerly a truck driver, and accustomed to lift heavy weights.   There was no evidence of syphilis.   He was well up to three months ago, when he had a rather profuse hemorrhage from the mouth, which was followed after several days by a second and a third.   On his admission to the hospital, a pulsating tumor was detected in the thorax at the root of the neck. Bleeding from the mouth took place several times while he was in the hospital, the last occurring just before death. At this time he lost thirty-five ounces of blood.   The autopsy

revealed a sacculated aneurism of the arch of the aorta, measuring ten by ten centimetres and extending upward, backward, and to the left. There was a large opening on the posterior aspect firmly adherent to the bodies of the vertebræ, which were not eroded. There was a second circular opening into the œsophagus, five millimetres in diameter, at a point three centimetres above the bifurcation of the trachea. The left lower lobe of the lung was distended with aspired blood.

GUMMATA OF BRAIN WITH WIDESPREAD SYPHILITIC INFILTRATION.

Dr. JOHN H. LARKIN presented this specimen, which came from a prostitute, twenty-six years of age, who had had the primary lesion four years before, and had little or no treatment at the time. For three months before her death she complained of severe nocturnal headache, vomiting, and diminution of vision in the right eye. On her admission to the hospital, one week before death, she had headache, double right-sided hemianopsia, and confusion of ideas. There was also a large elevated mass over the left parietal protuberance. She grew rapidly worse and died in coma. At autopsy the bone over the left parietal eminence was found to be soft and necrotic ; the dura mater was adherent to the brain and necrosed bone ; the periosteum was greatly thickened over the whole left parietal bone, but especially at the site of the necrosis. There were no other manifestations of syphilis in other viscera, which were, including the heart and liver, in a state of advanced fatty degeneration.

CHRONIC NEPHRITIS AND CARDIAC HYPERTROPHY ; EXTEN-SIVE HEMORRHAGES.

Dr. G. A. TUTTLE presented the heart and kidneys of an Italian, twenty-five years of age. For a month and a half the man had had hemorrhages from the nose and mouth, but no cough. Later there had been some bleeding from the lobe and canal of the ear, from the lip and tongue,

and a clot had been passed by the rectum. He had a general convulsion on the day of his death. The urine contained albumin, but no casts. There was marked anæmia. The autopsy revealed no cause for the hemorrhages beyond chronic nephritis and cardiac hypertrophy.

HEART CLOT ; GRANULAR NEPHRITIS.

Dr. Tuttle also exhibited the heart of a woman who had complained for a few days of feeling vaguely ill. A few hours before her death she became deeply cyanosed. There was a double murmur at the apex and at the base ; the urine contained albumin and casts. Microscopical examination of the mass in the left auricle showed it to consist largely of clotted blood, apparently fresh, and in other parts of organized clot. The kidneys showed a granular nephritis.

SIMPLE ULCER OF THE STOMACH INVOLVING THE SPLENIC VESSELS AND THE PANCREAS.

Dr. Tuttle also exhibited a specimen showing simple ulcer of the stomach, with the pancreas for its base at each end, the central portion of the pancreas having sloughed away. In the floor of this ulcer were seen the openings of the splenic vein, the intervening portion of the vein having entirely disappeared. There was also a single opening into the splenic artery, which caused the death of the patient. In addition there was a small abscess in the tail of the pancreas. Microscopical examination of the pancreas and edges of the ulcer showed no new growth. The specimen was taken from a woman, fifty-one years of age, who died August 24, 1897.

Stated Meeting, May 11, 1898.

T. MITCHELL PRUDDEN, M.D., PRESIDENT.

CASE OF ACUTE YELLOW ATROPHY OF THE LIVER.

Dr. F. C. WOOD presented a specimen of acute yellow atrophy of the liver, taken from a woman, thirty years of

age, who had been operated upon for a uterine fibroid. At the time of the operation it was found that there was a large pyosalpinx on the left side. For about three days the case did well; then it was noticed that the conjunctivæ were very yellow. On the fourth day muscular twitchings developed, limited to the hands and feet. The following day she was comatose, and death occured twenty-four hours later. During the last two days the jaundice was very marked. At the autopsy the liver and kidneys presented the chief points of interest. The liver was extremely soft, so that it did not retain its shape when removed from the body. On section, it presented a dead yellow hue. There was no obstruction to the flow of bile, and no lesions were discovered in the intestinal tract. The kidneys were very pale, the markings were lost, and the organ was deeply tinged with yellow. Microscopical examination of the liver showed complete degeneration of the liver cells, and a great deal of fat in the cells. The kidneys showed the lesions of acute degeneration. The tubular epithelium was swollen and did not stain. Cultures taken from the liver gave streptococci in one tube, but further investigation seemed to show that this was a contamination. As the woman had been well before the operation, and there was a likelihood of infection having taken place from the pyosalpinx during operation, it seemed probable that such an infection was the underlying cause of the condition found at the autopsy. A section of the liver was exhibited under the microscope.

Dr. EUGENE HODENPYL said that Ziegler stated in his text-book that the lesions of acute yellow atrophy of the liver usually began around the periphery of the lobule, and extended toward the centre. In a specimen at the laboratory of the College of Physicians and Surgeons this condition was reversed. From an examination of the sections from the case just presented it seemed probable that the process had from the onset involved the parenchyma of the lobules uniformly.

CASE OF SUPPURATIVE (STREPTOCOCCUS) PORTAL PHLE-
BITIS, WITH RUPTURE AND FATAL PERITONEAL
HEMORRHAGE.

Dr. EUGENE HODENPYL presented specimens from such a case. The patient was a young man who had been sick for less than three days with symptoms of a mild and indefinite character. Death took place quite suddenly from a large peritoneal hemorrhage. He was twenty-five years of age, temperate in his habits, and had enjoyed good health previously, with the exception of an attack of typhoid fever three years before. His last illness began with a chill, followed by general pains throughout the body associated with an occasional attack of vomiting. The next day there was some little pain all over the abdomen. On his admission to hospital his temperature was 98° F.; pulse, 66; respirations, 24. The examination of the urine was negative. There was no abdominal tenderness and no tumor. The chief complaint was of abdominal pain and prostration. The diagnosis was neurasthenia. Ten hours later he suddenly collapsed; there was "air hunger," and death occurred without further premonitory symptoms. At the autopsy the abdominal cavity was found distended with clotted and fluid blood, and the organs were quite pale. On the under surface of the liver in the transverse fissure was a small sac, and on one side of the sac was an irregular opening. From its position the sac was regarded as a dilated portal sinus which had ruptured. The liver was pale, but no lesions were detected on macroscopical examination. Unfortunately, no cultures were made from the various organs. On microscopical examination it was found that the sac was actually the wall of the portal vein, and that this wall was extensively infiltrated with leucocytes and fibrins, and that there were numerous streptococci present. Sections through various portions of the liver revealed a suppurative portal phlebitis throughout the entire organ, associated with the presence of streptococci. No gross lesions of the intestinal tract were discovered.

RUPTURE OF AN ABDOMINAL AORTIC ANEURISM SIMULAT-
ING TUMOR OF THE KIDNEY.

Dr. Hodenpyl also presented a specimen of false aneurism
which had ruptured into the retroperitoneal tissue, forming
a mass which simulated a tumor of the kidney.   The speci-
men was taken from an old syphilitic who for one year
previous to death had had a dull constant pain in the
epigastrium, with occasional attacks of vomiting.   Four days
before death almost complete suppression of urine suddenly
developed, associated with very marked prostration and
pallor.   He was admitted to hospital because of the urinary
symptoms.   Physical examination showed a large mass in
the left side, in the region of the kidney.   Suspecting a
tumor of the kidney, Dr. A. B. Johnson performed an ex-
ploratory laparotomy on the left side, and opened up an enor-
mous blood sac, from which the hemorrhage was most
profuse.   The patient died shortly afterward.   The autopsy
showed in the thoracic portion of the aorta a small aneurism,
and in the abdominal aorta, near the site of the cœliac axis,
a large pouch was found lying on the anterior surface of the
aorta and communicating with a small sacculated aneurism.
On the left of the false aneurism was a ragged perforation.
A large quantity of effused blood was found behind the
peritoneum.

Dr. HENRY POWER said that the first case reminded him
of an autopsy made by Dr. Hodenpyl some time ago upon a
woman who had died of rupture of the bladder.   In the
veins of the spinal cord there had been found an infiltration
of round cells, apparently without any cause.   No bacteria
were present.   Possibly the greater distance from the intes-
tinal canal might explain this fact.   A careful study of the
literature at the time brought out an exact description and
accurate drawings of the existing condition, in Ziegler's
Pathology under the head of " Syphilitic Changes."

FATAL CASE OF ANTHRAX.

Dr. CHARLES NORRIS presented specimens from a case of

anthrax, occurring in a longshoreman who had come to the
Vanderbilt Clinic on April 5th. The man said that he had
been in the habit of handling hides, and had last done this
seven days previously. On April 1st, he noticed a small
pimple over the left side of the jaw, but he felt well until
four or five hours before coming to the hospital ; at that time
there had rapidly developed œdema of the face and neck,
associated with malaise and fever. Examination showed a
slightly depressed pustule, about the size of a five-cent
piece ; the epithelium around the edge was elevated by an
accumulation of clear, colorless serum containing anthrax
bacilli in vast numbers. A mouse inoculated with one loop
of an agar culture died in eighteen hours. The pulse was
rapid, intermittent, and small. On April 6th, the pustule
was excised, and a long incision was made along the neck
down to the clavicle, to relieve the œdema. On examination
of the blood it was found to be sterile. The man died three
days after the onset of the œdema. The chief clinical
symptoms were the œdema and the great prostration. The
autopsy was made by Dr. Hodenpyl seventeen hours after
death. The subcutaneous tissues of the neck, thorax, and
abdominal wall, and the tissues of the mediastinum, were swol-
len and very œdematous. The peritoneal cavity contained
some turbid fluid. In places, the small intestine was the
seat of an extensive hemorrhagic infiltration. The mesentery
of the small intestine and the retroperitoneal cellular tissue
were the seat of extensive interstitial hemorrhage. The liver
was normal in size and in appearance on section. The
spleen was enlarged, soft, and congested. The kidneys ap-
peared to be normal. In the sections of the pustule
numerous bacilli were seen, occupying the rete mucosum in
clumps. Sections of the liver showed areas of degeneration
which appeared to be toxic in their origin, as no bacilli could
be found in the sections or by culture. The kidney showed
only a slight parenchymatous degeneration. Cultures were
made at the autopsy, and anthrax bacilli were recovered
from the spleen and blood, but not from the liver. From

the liver, spleen, and blood numerous colonies of the Fried-
länder bacillus were recovered. Microscopical specimens
from this case were also exhibited.

Dr. W. H. PARK said that he was reminded of a case sent
about a year and a half ago to the health-department labora-
tory. Dr. Nammack had excised a large piece from the
neighborhood of the eye, yet examination showed only five
colonies of anthrax on two plates, and none were found in
cultures in broth tubes. This fact illustrated the ease with
which the condition might be overlooked. This patient
recovered.

Dr. NORRIS said that he understood it was often difficult
in cases which did not terminate fatally to recover the
anthrax bacilli from the pustule. About twenty-five per
cent. of the cases were fatal when the pustule was on the
face, and about five per cent. when the pustule was on
the lower extremity.

DEMONSTRATION OF THE YELLOW-FEVER BACILLUS (SANARELLI).

Dr. CHARLES B. FITZPATRICK said that Sternberg in his
recent papers seemed to be of the opinion that Sanarelli's
bacillus was identical with his bacillus X. Dr. Fitzpatrick
believed that there were well-marked differences between the
two bacilli. Sanarelli gave as the diagnostic point of his
bacillus its appearance on agar—a concentric growth having
an irregular outline. The central part of the colony was
dark and was surrounded by a more transparent zone of
growth. A specimen was exhibited which was the counter-
part of one received from Sanarelli. Sanarelli's bacillus lost
very rapidly its characteristic form of growth. Dr. Fitzpat-
rick said he thought it would be found in time that the
bacilli which had been described by Sternberg, Sanarelli, and
himself belonged to the colon group. Dr. Sternberg stated
in his work on the etiology of yellow fever that his bacillus
X was the bacillus coli communis, and was, therefore, not
the cause of yellow fever. Dr. Fitzpatrick said that the bacilli

(bacilli coli icteroides and bacilli coli concentricus) which he had described in the *Medical Record* of January 29, 1898, he now believed to be a single, separate, special form of the colon group, and would designate it as the bacillus coli icteroides. Its special virulence and other characteristics were sufficient to separate it from the ordinary colon bacillus. This bacillus (bacillus coli icteroides), when grown at 37° C. for about sixteen hours and then kept at room temperature for twenty-four hours, forms in agar either ordinary round colonies, about one millimetre in diameter, with a dark central point, or concentric colonies, about three to five millimetres in diameter, with a dark, round, central area surrounded by a transparent zone, with a somewhat raised and irregularly round border. It differed from the bacilli icteroides (Sanarelli) in having, when grown in bouillon, a distinct flaky surface growth and a well-marked deposit. Dr. Fitzpatrick believed that the bacilli coli icteroides could very well be the agent of infection and death in yellow fever, nothwithstanding that it belonged to the colon group of bacteria.

MELANO-SARCOMA OF THE VAGINA.

Dr. F. S. MATTHEWS reported a case. Next to the Fallopian tube no part of the female genital tract, he said, was so infrequently the seat of primary sarcoma as the vagina. Of the primary sarcomata of the vulva a large per cent. were melanotic. In this they differed from those of the vagina. A search through the literature of the subject had revealed only one undoubted case. This was reported by Parona (*Ann. univ. med. Chir.*, page 241, Milan, 1887). Veit (*Handbuch für Gynäkologie*, 1897) in his article on tumors of the vagina had said this was the only reported case of melanosarcoma primary in the vagina. He spoke of it as a " melanotisches spindelzellen Sarcoma in Septum vesico-vaginale." In the preparation of this article Veit had collected fortyseven cases—seventeen in children and thirty in adults—the case of Parona being among the latter. Several cases of

sarcoma of the vagina had been reported since the ap-
pearance of Veit's article. Two of these were reported by
V. Horn (*Monatschrift f. Geb. u. Gyn.*, iv., page 409, 1896).
Though they were not melano-sarcomas, one of them de-
served mention in this connection. The patient was a resi-
dent of Hamburg, aged forty-nine years, married. She had
had seven children and five abortions. The last child was
ten years of age. She had reached the menopause five years
previously. At the time of operation she had been troubled
for five months with a foul-smelling bloody vaginal discharge.
She was operated upon twice. At the first operation the
primary tumor in the vagina was removed and also sarcoma-
tous inguinal lymph nodes. The tumor returned speedily in
the vagina, at the orifice of the urethra, in the labia, and in the
inguinal lymph nodes. The primary tumor was an alveolar
spindle-celled sarcoma free from pigment, but the uninvolved
mucous membrane was pigmented, the pigment being chiefly
confined to the corium. The interesting feature, however,
was that the secondary deposits, both those removed at the
primary operation and later, were deeply pigmented. Horn
stated that this was not to be considered as melanotic
sarcoma. The presence of pigment in the secondary de-
posits, he said, was due to the hemorrhagic character of the
growth, the blood pigment being taken up by the cells of the
new growth. The speaker said that this left the case of
Parona's as the only one reported of primary melano-sarcoma
of the vagina. To this report a case occurring in the ser-
vice of Dr. George M. Tuttle at Roosevelt Hospital might
be added. The tumor came into the speaker's hands
through the kindness of Dr. Eugene Hodenpyl, the patholo-
gist to the hospital.

A. K——, aged forty-two years, married, housewife,
Russian. Admitted to hospital, November 20, 1897; dis-
charged, December 3, 1897. Menopause eleven months ago.
Seven children, the last ten years ago; no miscarriages.
The history of the present illness was that for two months
she had had a feeling of lack of support and falling of the

uterus, and recently had felt something in the vagina.   She had also had a slight dragging pain.   The discharge had not been profuse but was increasing.   .

On physical examination the uterus and appendages were apparently normal.   There was a tumor growing from the anterior vaginal wall.   It began an inch behind the meatus urinarius and extended backward to within an inch of the cervix uteri.   The growth measured an inch in its lateral diameter.   It was of the size of a hen's egg, had a rough, cauliflower-like appearance, bled easily, was hard, and very dark-colored.   The growth was removed with knife and cautery.   There was very little bleeding.   The vagina was packed with iodoform gauze.   The patient left the hospital improved, but a large granulating area persisted over the anterior vaginal wall.   The tumor, when removed, was oval, and of about the size of a hen's egg.   In its thickest portion it was twenty to thirty millimetres thick and was thrown into irregular elevations.   Microscopically, it was a large round-celled melano-sarcoma.   It lay upon the muscular wall of the vagina but had not invaded it.   In the central portion of the tumor it was superficial and presented a ragged surface denuded of epithelium ; laterally it was covered by the vaginal mucous membrane.   The tumor be- came thinner toward its lateral portions and appeared at the periphery as a growth not more than one millimetre in thickness, dissecting its way immediately under the mucous membrane and sending prolongations up into the papillæ. The pigment showed no definite arrangement.   Those cells which contained it were filled with it so as to be perfectly opaque.   The number of pigment cells in different portions of the tumor was variable.   No part of the tumor was entirely free from pigment.   At the advancing edge the cells were pigmented, just as in the central portions of the tumor. There was no definite grouping of pigmented cells about capillaries, as in Horn's case ; hence the occurrence of pig- ment could not be explained as in his case, by supposing the cells to have derived their pigment from extravasated blood.

The cells of the tumor were large; they were round, oval, polyhedral, with large, distinct nuclei. The specimens presented were stained with hæmotoxylin and eosin, and with Van Gieson's picro-acid fuchsin. The tumor undoubtedly had its origin in the connective tissue of the papillæ of the mucous membrane and was spreading by continuity of tissue, showing no tendency as yet to involve the muscular wall.

VARIETIES OF THE BACILLUS DIPHTHERIÆ FATAL TO GUINEA-PIGS WITHOUT THE PRODUCTION OF THE DIPHTHERIA TOXIN.

Dr. W. H. PARK presented a paper written by Miss LOUISE DUDLEY DAVIS. It was entitled " Preliminary Report on a Bacillus Resembling the Bacillus Diphtheriæ Found in Certain Scarlet-Fever Cases." The writer stated that during the past winter cultures had been taken from many cases of scarlet fever at the Willard Parker Hospital in order to demonstrate the presence or absence of streptococci. In one case of ear abscess, complicating scarlet fever, the examination of the discharge unexpectedly revealed a short bacillus, resembling that of diphtheria. In a second case of ear abscess this bacillus was also found. Agar plates showed spreading colonies with light, uneven edges, and dark centres, but the growth was a little heavier than that ordinarily presented by the diphtheria bacillus. The presence of the bacillus in these two cases resulted in the taking of cultures from other cases of suppurative otitis media—twelve in all. Smears from all these cultures showed short bacilli, staining irregularly. In ten cases the bacillus was isolated from cultures taken from the ear abscess, and in all but three of those taken from the throat also. Unfortunately in these three the cultures were taken some days later than were those from the ear. All of the cases presented clinically typical appearances of scarlet fever, but the unusual proportion of suppurative otitis media was worthy of note, and might have some connection with the presence of this

bacillus. One case developed a membranous exudation in the throat which gave a culture closely resembling that of diphtheria; but no other cases of diphtheria were in the ward, and the patient recovered quickly. A pig, inoculated subcutaneously with two cubic centimetres of the culture from Case II., died twenty-four hours afterward, and the autopsy showed a general serous peritonitis and marked congestion of the kidneys, liver, and spleen. Plates and cultures from the heart's blood, organs, and tissue, at the point of inoculation, showed pure and abundant cultures of this bacillus. The absence of the usual lesion of diphtheria and the presence of signs of septicæmia made the experiment one of great interest. The original culture soon lost in virulence, so that eleven cubic centimetres was necessary to cause death. The bacillus was non-motile, produced acid in glucose bouillon, and did not form gas in fermentation tubes. It produced a general septicæmia, and did not form diphtheria toxin, as shown by the fact that diphtheria antitoxin seemed to hasten rather than retard the death of the pigs. It had not yet been determined whether it produced a toxin of its own, but it seemed probable that it did not do so to any marked degree. The questions which very naturally arose, and which had not yet been answered, were: Was this bacillus an attenuated diphtheria bacillus? Was it a variety of that group? Was it an entirely distinct organism?

Dr. Park also read a communication for Dr. ANNA WILLIAMS regarding a bacillus possessing characteristics similar to those of the bacillus studied by Miss Davis. This bacillus was obtained from the throat of an individual about six weeks after recovery from diphtheria. The organism was morphologically and culturally similar to a typical diphtheria bacillus. In small doses it proved non-virulent for medium-sized guinea-pigs, but by very large doses (ten cubic centimetres of a forty-eight-hour broth culture in which were mixed the twenty-four-hour cultures from three serum and three agar tubes) death was produced. On autopsy the

bacillus was found in all the organs. The inoculation of a quantity of antitoxin sufficient to protect against two hundred thousand times the fatal dose of diphtheria toxin, did not protect the animals against one fatal dose of this bacillus.

DIPHTHERIA BACILLUS NO. 8.

Dr. PARK said that on August 28, 1895, a bacillus had been isolated from a case in which the clinical diagnosis was " tonsillitis." This had proved to be the most virulent bacillus they had ever found, and was possibly the most virulent that had been met with anywhere. It had been sent to numerous laboratories in different parts of the world. This bacillus would kill a medium-sized guinea-pig in a dose of one-two-hundredth cubic centimetre. By keeping it at a temperature of 36° C. and transplanting in bouillon every four days, it had been possible to maintain the same virulence now for nearly three years. The cultures used for toxin production had never been passed through animals.

Dr. PRUDDEN said that this communication emphasized the difficulties felt by all bacteriologists regarding what should be termed " species " in bacteria. Two of the speakers had taken refuge, as most did, behind the term " groups," and perhaps this was as secure a position as it was possible to maintain at the present time. The report, just published, of the committee of the American Public Health Association probably gave the fullest and most carefully considered data for the observation of species. Another point of interest in connection with the paper was the extreme delicacy of the physiological test. Even bacteriologists did not always realize what an extremely minute chemical difference in the biological qualities of the bacteria determined whether or not the product should be poisonous. In some respects this physiological test was the most delicate one in our possession.

Dr. POWER said that he had four clinical cases during the past winter in the same family, which were of interest in this

connection.   The first patient, while away from home in Newark, received antitoxin, though the culture from the throat was reported to be negative.   This person recovered and returned home to Montclair.   The second patient promptly became sick and came under the speaker's care in the Mountainside Hospital.   The patient was very ill, although antitoxin was given, and became severely para- lyzed.   Two other members of the same family were ad- mitted at the same time with a large amount of membrane in the throat.   They were injected with antitoxin earlier than the preceding, and had no paralysis.   In none of the four cases were any typical diphtheria bacilli found by the examiners in two health-board laboratories, but streptococci were found in each case.

FOCAL NECROSIS IN THE LIVER, FOLLOWING MEASLES IN YOUNG CHILDREN.

Dr. ROWLAND G. FREEMAN presented this paper.   He said :

" The action on man and the lower animals of the toxins produced by bacteria without the presence of the bacteria themselves has received much attention recently.   Focal necroses have been observed resulting from the toxins of diphtheria, typhoid fever, acute lobar pneumonia, malaria, streptococcus infection, and Asiatic cholera, and the lesions produced have been found to belong to the same general class.   Moreover, two toxalbumins of vegetable origin, ricin and abrin, have been found to produce similar lesions.   This subject has been recently carefully studied and investigated by means of animal experiments by Dr. Simon Flexner, of Johns Hopkins University (*Johns Hopkins Hospital Reports*, vol. vi., 1897).   The lesions produced by these poisons are wide-spread, involving the lymphatic system and the different viscera.   The gross changes found at autopsy are, however, not usually very characteristic.   The lymph nodes are enlarged, particularly near the point of invasion.   The liver is often congested and is apt to show fatty change.

On the surface as well as on the cut surface there may be seen small white or yellow dots, round or oval in shape, which are not elevated and which vary in size from mere points to areas ten millimetres in diameter. These dots are due to areas of focal necrosis. The small areas of focal necrosis do not produce lesions visible to the naked eye. When distinct, these spots are distinguishable from other similar lesions. In the other organs there are no characteristic gross changes. Congestion may be present. The change which occurs in the lymph nodes or in any of the viscera is that of cell necrosis in the different stages and involving either isolated cells or groups of cells. These changes involve first a swelling of the cell body, the cytoplasm becoming more homogeneous and more refractive, and acquiring an affinity for acid dye (eosin). The cell nuclei first stain more deeply and later lose their staining properties. Fragmentation of the nucleus is frequently seen. In some areas of focal necrosis many of these changes may be studied, the periphery of the area furnishing the earlier lesion while the central part furnishes later stages. This condition, although it has been described as following a number of acute diseases, as just enumerated, has not, so far as I know, been described as following measles. It has therefore been thought that examples of it following this disease may be of interest.

"An epidemic of measles occurred at the New York Foundling Hospital the early part of last winter, the characteristics of which have been described by Dr. W. P. Northrup (*Medical News*, vol. lxxi., No. 26, 1898). It was on the whole more mild than previous epidemics of the same disease in that institution, showing a mortality of only 13.9 per cent. It was not, however, free from cases showing very severe complication, such as gangrene about the mouth, ear, vulva, and anus. In all, twenty-five cases came to autopsy. In the first eleven of these cases no evidences of toxalbumin intoxication were noted, nor were they particularly looked for. The twelfth case, however (the liver of which I pass around), gave such evidence of some unusual lesion that the diagnosis

was readily made and all subsequent material was carefully looked over and preserved for microscopic examination. Of the fourteen cases which then came to autopsy, including the first case which was recognized as focal necrosis, twelve specimens were preserved, cut, and examined, and it is these twelve cases which I report. Of these cases four gave distinct focal areas of necrosis of the liver. In three of these the areas were frequent and quite typical. In the fourth case, although ten separate pieces of liver were cut, only one area of focal necrosis was found. In one of them similar areas were present in the Malpighian bodies of the spleen. In these four cases the patients varied in age from eight months to three years. They died at periods ranging from eleven days to thirty-three days after the onset of the measles. One of the patients was not very severely sick and at the end of two weeks seemed to be convalescing, and remained fairly well for two weeks more when the temperature rose to 104° F.; râles appeared in the chest, and death followed three days later. Of the other three cases all had broncho-pneumonia ; one had an ulceration near the anus, and another gangrene of the vulva."

Dr. PRUDDEN said that when such lesions of the nervous system as disseminated sclerosis occurred in later life, and an attempt was made to trace them back, measles was apt to be overlooked. This disease, as well as other more immediately serious infectious diseases, might prove a possible origin of some of these obscure lesions of later life.

Dr. J. H. LARKIN said he had been struck by the fact that in the focal necrosis found in measles, as just described, there were very few areas as compared with the number observed in other diseases, e. g., typhoid fever. Nor did he see in the specimen presented that peculiar form of focal necrosis found not infrequently in typhoid fever, in which there was a large area around the hepatic vein, and the liver cells were dead and the nuclei had disappeared. This form could be produced experimentally, which was not the case with the form described in Dr. Freeman's paper. If the focal necrosis in

these cases of measles was produced by the toxins, the latter must be much milder than those producing focal necrosis in diphtheria and typhoid fever.

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Stated Meeting, October 12, 1898.

T. MITCHELL PRUDDEN, M.D., PRESIDENT.

A CASE OF ACUTE YELLOW ATROPHY OF THE LIVER.

Drs. R. S. ADAMS and ROWLAND G. FREEMAN presented the report of this case, which occurred in the service of Dr. J. J. Reid, of the New York Foundling Hospital.

Dr. Adams said that, as only a few over two hundred cases had been reported in medical literature, the following history might prove of interest. The patient was Annie D——, aged twenty-four years, a laundress, from Ireland, who had been one year in the United States, and was nursing her first baby, born about two months previously. She had been confined at another institution—the City Hospital —but there had been nothing noteworthy about the confinement, and she seemed in excellent health for the next two months. Then she suffered for about ten days with symptoms referable to a mild gastro-enteritis ; viz., languor, slight nausea, occasional vomiting, anorexia, and gradually increasing jaundice, constipation, clay-colored movements. Then began hallucinations, fear that her baby would be taken away because she, the mother, was sick. The temperature was 99°–100° F. ; there was much thirst ; and although usually quiet, she occasionally became almost maniacal and told of strange visions. Examination showed jaundice, slight enlargement of the liver, and a normal condition of the heart and lungs. Shortly afterward she became very much excited, and on March 18th she was sent to the hospital ward, the mild symptoms having then continued for about ten days. At this time the temperature was normal ; the pulse was full and about 90 ; the respirations were natural and about 18 ;

the mind wandered a little ; there was severe pain in the back ; the jaundice deepened. She was very drowsy, and at times quite stupid. She passed plenty of urine, high-colored and containing a trace of albumen, bile pigment, and bile acids. There were frequent semisolid movements of a clay color. A diminution in the size of the liver could already be made out, especially in the left lobe. The spleen was slightly enlarged. Owing to the profound changes in the blood, and the good effects of the transfusion of saline solution in uræmia being considered, phlebotomy was performed, about four ounces of blood removed, and in its place eight ounces of decinormal saline solution infused. A considerable but fugacious improvement in the mental condition followed. On the following day, March 20th, her temperature was 97° F., the pulse was about 78, the respirations were deep, and she was quiet and apparently suffering no pain. The liver was smaller. A few spots now appeared on the chest, abdomen, and legs—papules and reddish ecchymoses—but the eruption was painless and did not itch. No hemorrhages elsewhere were observed. In the afternoon another saline infusion was given, in view of the apparent utter hopelessness of any other medication. This was followed by a chill, incoherent and muttering speech, and slight delirium. She was very slow of comprehension and, when aroused, was very irritable. There was marked thirst. On March 21st, she was quiet and apparently very weak. Perspiration very free and of a peculiar odor ; temperature, 95° F. ; pulse feeble ; respirations very deep. Diminution in size of the liver was now extremely marked ; she had apparently lost her liver over night, and there was now some incontinence of fæces. The urine was about normal in quantity, of a specific gravity of 1.028, and contained a trace of albumen, bile pigments, leucin, and tyrosin crystals. On March 22d she passed from unconsciousness to coma with deep, noisy breathing ; the temperature rose gradually from subnormal to 105° F. before death, the pulse becoming accelerated some time before, and keeping pace with the temperature. She died on March 22d,

about two weeks after the commencement of the symptoms, and about four and one-half days after the first severe symptoms, at which time only could the diagnosis be made with certainty.

The autopsy was made sixteen hours after death. The body was well nourished and markedly jaundiced. No œdema was present. The left lung was congested ; the right was firmly bound down by adhesions, and was also congested. The heart was negative. The lower border of the liver was at the level of the ensiform cartilage. Its surface was smooth, but it was very soft and friable, and crackled on being pressed, as if it contained air. The gall bladder contained half an ounce of thick yellow fluid. The liver weighed two pounds one ounce. Its cut surface was of a dark red color, and presented irregular areas of bright yellow color. The spleen was enlarged, weighing one pound one ounce. It was dark red, friable, and soft. The left kidney was enlarged and soft, the capsules were adherent, and the cortex was rather thin, with rather indistinct markings. The right kidney was similar to the left. The pancreas was markedly enlarged, being nine inches long. It crackled on pressure, as if containing air. In the caput coli was an intersusception, from below up, with marked swelling of the intestine, forming a hard tumor. The uterus was slightly enlarged, its cavity having a capacity of one drachm.

The microscopic examination of the tissue showed the liver to have undergone the cell degeneration characteristic of acute yellow atrophy. In addition, there were small empty spaces in the liver, which were surrounded by large, short bacilli. The outline of the cell body was indistinct, and the nuclei failed to stain. The pancreas also showed marked degenerative changes, the nuclei, for the most part, failing to stain with hæmotoxylin, and the outline of the cell body being indistinct. The kidney also showed cell degeneration, the change being more marked in the cells lining the tubules than in those in the glomeruli. Aërobic cultures were made from the organs and showed only the bacillus

coli communis, but the bacillus found on microscopic exam-
ination surrounding the spaces of the liver differed from the
coli communis, and owing to the facts of its morphology, its
gas production, and its failure to grow in aërobic plates, the
conjecture would seem to be justified that it was the bacillus
aërogenes capsulatus.   Its identification was, however,
incomplete.

Dr. ROWLAND G. FREEMAN exhibited under the
microscope specimens from the case.

Dr. HARLOW BROOKS remarked that a number of cases
of acute yellow atrophy had been collected, in which the
disease had first appeared shortly after labor, and in which
there had been reason to believe that there had been some
septic infection.

STENOSIS OF ŒSOPHAGUS ; CARCINOMA.

Dr. J. H. LARKIN reported a case of this kind occurring
in a male, aged forty-five years, who entered the hospital.
September 27, 1896, stating that he had always been well
up to five weeks previously, when, while at dinner, he had
swallowed a fishbone, and it had lodged in his throat.   From
that time until his admission to the hospital he had been
able to take fluid diet only.   On admission he was well
nourished, and the physical examination of the heart, lungs,
liver, and kidneys was negative.   There was nothing in the
history pointing to the passage of a bougie by the surgeon,
and inquiry showed that this could not be done, on account
of the pain. On September 29, 1896, a gastrostomy was
done in the left hypochondriac region, and the stomach wall
was attached to the abdomen.   He remained in the hospital
till October 14, 1896, when he was discharged, having learned
how to take care of his wound and feed himself properly.
He remained perfectly well till April 19, 1898, when he came
back, complaining of severe dyspnœa, which had been grow-
ing worse for the past three weeks.   At this time physical
examination gave complete dulness over the right lower lobe
of the lung, with absence of breathing and voice.   An

aspirating needle encountered a firm, hard mass, and no fluid was obtained. He continued to grow worse, and died on April 25, 1898. At the autopsy the body was found to be fairly well nourished, and there was a rubber tube in the gastrostomy wound which communicated with the stomach. There was no peritonitis. There were some old adhesions over the left lung posteriorly, and some compensatory emphysema of that lung. The other lung was bound down at its base by firm adhesions. The heart, lungs, œsophagus, and stomach were removed *in toto*, and the following conditions found : The left lung contained a few scattered, hard, white nodules about the size of a pea. The upper and middle lobes of the right lung were emphysematous, while the lower lobe was firm and solid, and presented a grayish-white, glistening appearance. Sections of this lobe revealed some of the larger bronchi remaining, but narrowed and compressed. The left bronchus was slit up and found to be patent, a filiform bougie passing out of the cut ends in the lung tissue. The right bronchus was slit up, and the bronchi supplying the upper and middle lobes were found to be patent ; but the bronchi going to the lower lobe were stenosed, and a fine filiform bougie could not be passed out into the lung tissue. Both branches of the pulmonary arteries were normal. The right pulmonary vein was stenosed, and its wall was surrounded by a cicatricial mass which had its origin at the root of the lung posteriorly. The vein admitted with difficulty a fine filiform bougie, which passed out of the cut ends in the lung tissue. The œsophagus, from the cardiac end to a distance of eight centimetres upward, was stenosed, and its wall thickened and changed into very dense cicatricial tissue. After patient work, a fine filiform bougie was passed from above downward. About the middle of the stricture was a small blackish mass, but this could not be recognized macroscopically as a fishbone, nor under the microscope as bone tissue. The liver contained several larger and smaller, very hard and cicatricial metastatic nodules, varying in size from one centimetre to four centi-

metres in diameter.   Some of these nodules were undergoing
calcification at the centre.   The kidneys were normal except
for a few hard metastatic nodules.

Transverse and longitudinal sections of the œsophagus at
the site of the stricture were studied microscopically, and
found to be composed of very dense cicatricial tissue, in
which could be seen small, squeezed, and contorted alveoli
filled with epithelial cells.   The latter could be traced from
the mucous surface, dipping down and infiltrating the tissues
beneath.   Sections of the isolated nodules in the lung tis-
sue showed mostly fibrous tissues, with numerous small and
contorted alveoli containing closely packed epithelium.
The sections of the lower lobe of the right lung showed
intra-alveolar and interstitial pneumonia.   The outline of
the air vesicles was preserved ; their walls were thickened,
and in the cavity was a dense growth of new fibrous tissues
and blood-vessels.   Sections of the metastatic nodules in
the liver were likewise nearly all fibrous tissue, with the same
small alveoli containing epithelial cell nests, with here and
there larger and smaller calcareous masses in the centre.
The nodules in the kidney were also mainly fibrous tissue,
with alveoli containing cells.   The sections of the stomach
wall proved of interest.   On account of the chronic and
constant irritation of a rubber tube the glandular coat had
disappeared, and its place had been taken by small round
cells.   The muscular coat was thickened, and the indi-
vidual muscle fibres were separated by small round-cell
infiltration.

To summarize, the most important features of the case
were : (1) An almost impassable stricture of the œsophagus,
eight centimetres in length, admitting only with difficulty a
filiform bougie. (2) Stenosis of the bronchi leading to the
lower lobe of the right lung, and stenosis of the right pul-
monary vein, both these factors inducing a chronic productive
inflammation of the whole lower lobe of the right lung.
(3) The peculiar microscopical picture of the metastatic
nodules in the lungs, liver, and kidneys, viz., the preponder-

ance of the fibrous-tissue element over the alveoli and epithelial cell nests :

CARCINOMA OF THE STOMACH WITH PERFORATION.

Dr. LARKIN also presented specimens from a case of this kind. The subject was a male, forty years of age, who had been in the hospital for eight months. The diagnosis at the time of his admission was carcinoma. He had complained only of epigastric pain, and had shown no other symptoms worthy of note until a few days before death, when he developed tympanites. The autopsy revealed the presence of a primary carcinoma situated in the wall of the stomach at the lesser curvature. The anterior wall was normal. The lymphatic nodes in the lesser curvature and those around the tail of the pancreas were involved, but aside from these there were no metastatic deposits. A small perforating ulcer had set up a peritonitis, which had been the immediate cause of death.

Dr. GEORGE P. BIGGS said that the changes in the lung, in Dr. Larkin's first case reminded him very much of two cases in which there had been prolonged pressure on one primary bronchus by an aneurism. In the cases referred to there was no evidence of pressure on the veins, but there was a chronic inflammatory process, with filling up of the alveoli and a decided growth of connective tissue into the alveoli. It was supposed that the interference with the passage of air through the bronchus into the lung and the retention of the secretions had been responsible for the chronic pneumonia.

A UNIQUE MALFORMATION OF THE KIDNEY.

Dr. CARLIN PHILIPS presented a unique specimen of kidney malformation. The specimen was taken from a male, aged thirty-six years, dying from chronic alcoholism. The genito-urinary history was not known. On either side of the abdomen were seen masses of kidney tissue, each having two ureters from separate pelves. These ureters

apparently divided dichotomously, as in the normal organ. The upper portion of each kidney mass was hydronephrotic, and the ureters from these portions on either side were markedly dilated, thickened, and tortuous.   Below they had no connection with the bladder or urethra and seemed to end blindly in a small pouch beneath the trigonum.   Here the pressure of the enclosed fluid had formed for itself a cavity, six centimetres in diameter, projecting up into and carrying with it the mucous membrane of the true bladder in the region of the trigonum.   This little sac-like cavity, projecting into the bladder at its base, resembled at first glance an attempt at formation of a second bladder, but in reality was only a secondary phenomenon.   The lower portion of each kidney mass was fairly well formed.   The portion on the left measured in length seven centimetres, on the right nine centimetres respectively.   On either side there was apparently a small band of connective tissue between the cortices of the upper and lower kidney masses, representing a division of kidney parenchyma by distinct capsule formation.   This ayer of apparent connective tissue had not yet been demonstrated microscopically.   The ureters from the lower portions on either side were normal in every way, and entered the base of the true bladder on either side of the little cystic dilatation.   The speaker was of the opinion that the upper portions of the kidney mass on either side were functionally separate organs.   He said a French observer, Rayer, had reported a number of cases of supernumerary kidneys which appeared to be similar to the one just reported.

Dr. MARY PUTNAM JACOBI suggested that the presence of extra ureters was evidence that the kidneys were separate.

Dr. GEORGE P. BIGGS said that he had several times found single kidneys with two separate pelves, each having a ureter.   In some cases the ureters emptied independently into the bladder, while in others they fused before reaching that viscus.   The essential difference between such specimens and the one presented, he believed to be the absence in the

latter of free outlet for the urine for the superior pelvis, which, therefore, became very much distended, and the resulting difference in appearance of the upper and lower portions would naturally suggest at first glance a double kidney.

Dr. PHILIPS remarked that there was apparently no connection between the ureters from the upper portions of the two kidneys and the true bladder in his case; they terminated blindly in a dilated pouch beneath the trigonum of the bladder.

Dr. LARKIN said that if the upper portion of both kidneys had been functionating, the damming back of the urine should have given rise to more hydronephrosis. There must have been some leakage or escape, otherwise there would have been a cystic formation rather than a mere dilatation.

EARLY CARCINOMA OF THE CERVIX.

Dr. EUGENE HODENPYL presented a specimen showing a very early stage of duct carcinoma of the cervix. The patient was sixty years of age, and about one month previously had first noticed a slight discharge from the vagina, occasionally containing a little blood. Examination by Dr. E. B. Cragin revealed a small ulceration of the cervix, principally about the os, but extending somewhat into the canal. A small bit of the wall of this ulcerated area was examined microscopically by Dr. Matthews, who found in the edge a tiny but unmistakable area of carcinoma. The uterus was promptly removed, together with the tubes and ovaries. The speaker said that his examination of the uterus confirmed the diagnosis of carcinoma and also showed that the lesion was a localized one, it being found only in the immediate neighborhood of the os. It would seem, therefore, that the woman had been spared the fate of a local recurrence. The specimen also emphasized the immense value of microscopic examination in such doubtful cases, for the operation would not have been justified, in his opinion, without the microscopical diagnosis.

A CASE OF APPARENT ABSENCE OF THE SPLEEN WITH
GENERAL COMPENSATORY LYMPHATIC HYPERPLASIA.

By Eugene Hodenpyl, M.D.

In looking over the literature for records of cases of
absence of the spleen in persons whose viscera showed no
other abnormality, one finds, as might be expected, the
number to be small.   That such cases have occurred seems
to have been accepted as a fact by some pathologists.
Rokitansky [1] states that the spleen may be entirely wanting.
Ziegler [2] states that the spleen may be absent in very rare
cases in otherwise healthy people, but neither of these
authors enters into details of actual cases.

I find records of nine cases of alleged absence of the
spleen.   Of these nine cases, two were found in very young
children, and the absence of the spleen was associated in
both with various other abnormalities.   In one of these lat-
ter cases (G. Martin [3]), a child, one and one-half months old,
who died in convulsions, was found to have no trace of a
spleen, but there were so many other structural defects
about the child that it could not be said to have been in an
otherwise healthy condition.   In the other case, likewise
(F. D. Birch-Hirschfeld [4]), a child who died an hour after
birth was found to be without a spleen ; the liver was enor-
mously enlarged.   While this case cannot be accepted as an
example of the occurrence of absence of the spleen without
detriment to health, yet so carefully was the autopsy con-
ducted, and by so competent a pathologist, that it would
seem certain that this case demonstrated at least the possi-
bility of entire absence of the spleen.   In passing, it may be
remarked that absence of the spleen occurring in monsters
and associated with absence of other important organs, like
the liver, stomach, and kidneys, need not here be consid-
ered.   As long ago as 1820 Heusinger [5] related several such
cases, some having been observed as far back as 1564.

Coming now to the remaining seven cases of absence of
the spleen in the adult, Jelenski [6] states that Meinhand, in St.

Petersburg, made an autopsy on a woman, aged fifty-seven, who had no trace of a spleen. He also states that J. J. Sachs, on February 8, 1845, performed an autopsy on an adult and found a similar condition of affairs to exist. Unfortunately, Jelenski gives no more details than are here mentioned. R. Libby,[7] in an article published in 1846, relates a case of a negro slave who was executed for murder in 1834, in whom no trace of the spleen could be found at the autopsy. The man during his life was subject to periods of melancholy, and was of a surly and irritable disposition. I am loath to accept this case without reserve, since it is stated that there was present in the abdomen, contiguous to the tail of the pancreas, an abscess (size not given) which was oblong in form. It seems not improbable that this abscess was the remains of the spleen. H. A. Ramsey[8] describes a case of a male, aged twenty-eight, who probably, judging from the description, died of general tuberculosis, in which the spleen could not be found. I am forced to believe from a perusal of the account of this case that the presence of the spleen was overlooked, and that it can therefore not be accepted as a case of true absence of the spleen. Koch and Wachsmuth[9] describe very briefly a case of a man, aged forty-nine, who was very large and very muscular, and who died of typhoid fever. The spleen is said to have been absent, and the splenic artery was wanting in this case. E. Moroni[10] and Gonzalez M. Olaechea[11] have each reported a case of complete absence of the spleen. I have been unable to obtain access to either of these two publications, neither have I been able to find abstracts of them.

The history of the case which I have to report is as follows:

N. W——, aged thirty-two, male, colored, native of United States, was admitted into Roosevelt Hospital, New York, May 4, 1898. Died May 7, 1898. Family history negative, personal history unimportant.

Present illness. The patient felt perfectly well up to four days ago, when he was seized with severe headache and

pains throughout the body.   The pain was especially severe over the lumbar region, and was made even worse by stooping.   On the following day pain over the left side of the chest became especially marked, and this was made worse on deep inspiration.   There were no chills.   A slight cough developed.   For the past two days there has been pain all over the abdomen, which became somewhat distended. There has been some constipation for the past few days.

On admission.   The patient was muscular and well nourished.   Mucous membranes jaundiced.   Pulse regular, but rapid.   Tongue coated.   The patient was apparently in great pain.   Temperature, 105° F.; pulse, 134; respiration, 34.   Urine negative.   Examination of the blood showed a marked leucocytosis, but no malarial parasites were found. Physical examination negative.

On the morning of the third day of his stay in the hospital, or on the seventh day of his disease, the patient suddenly went into collapse and died.   While he was in the hospital, the severe pain and gradually increasing jaundice were marked features.   The temperature ran an irregular course, ranging from 99° to 105° F.   The pulse was more nearly stationary at about 134.

Autopsy, seven hours after death.   The body was that of a large, well-developed, muscular negro.   The conjunctivæ were moderately jaundiced.   There were several old scars on the anterior surfaces of the legs.   In the peritoneum were several old peritoneal adhesions.   Mesenteric lymph nodes were markedly enlarged.   They were hard, and on section contained cheesy and calcareous material.   The retroperitoneal lymph nodes, more especially in the region of the promontory of the sacrum, were also enlarged, cheesy, and calcareous.   Some of these were one inch in diameter.   The appendix was normal.   The gall bladder contained no gall stones.   All the viscera, as well as the fat and subcutaneous connective tissue, were moderately jaundiced.   There were old adhesions over both lungs.   Both right and left pulmonary arteries were filled with a firm red

branching clot. The bronchial lymph nodes contained old fibrous and cheesy tubercles. Both lungs were considerably œdematous. The left pulmonary pleura was studded with many fibrous (healed) tubercles. Both lungs contained dense fibrous and cheesy tubercles, sometimes isolated, and at times occurring in conglomerate fibrous masses. They were rather more numerous in the right lung than in the left. In the heart several tiny, fresh (?) vegetations were found on the mitral valve. It was without appreciable stenosis. The heart muscle looked normal. The liver was large, weighing seven and one-half pounds. It was of a dark purple color. The organ was friable, and the cut section looked rather coarsely granular. The gall bladder contained one drachm of orange-colored bile. The common duct was occluded by a mass of enlarged lymph nodes pressing on it. The stomach was bile stained, and its mucous membrane was digested. The pancreas was atrophied. Notwithstanding careful search, no trace of the spleen was discovered. In the small intestine Peyer's patches presented a " shaven-beard " appearance, and occasionally the solitary lymph nodules were swollen. The large intestine was normal. Both adrenals were larger than usual. The kidneys were large. They showed no microscopic lesion. The brain and cord were not examined.

Anatomical diagnosis. Obstructive jaundice ; chronic general tuberculosis ; œdema of the lungs ; absence of the spleen.

MICROSCOPICAL EXAMINATION.

The more important microscopic features of this case were confined to the lungs, lymph nodes, the adrenals, and more especially to the liver.

Lungs. The nodules in the lungs were evidently tuberculous in character, although efforts to demonstrate tubercle bacilli were unsuccessful. The larger ones were largely composed of a dense, cheesy material, oftentimes containing calcareous masses, and were surrounded by zones of dense

fibrous tissue.   Most of them were more or less pigmented, and in some of the smaller nodules giant and epithelioid cells were seen.   The smaller blood-vessels commonly showed a fairly marked arteritis, with thickening of the media.

Lymph nodes.   The bronchial lymph nodes showed the usual characteristics of chronic tuberculosis.   The mesenteric and retroperitoneal lymph nodes presented several interesting features.   First, both seemed uniformly involved. Second, on section each contained more or less in the centre of the nodule a dense mass of dry, cheesy material, often containing calcareous matter, and making up from one-half to two-thirds the bulk of the node.   The appearance of the cheesy material was quite uniform.   No cell outline could be made out in it, and but very rarely could even nuclear fragments be detected.   Tubercle bacilli were not found. Surrounding the cheesy masses were fairly thick zones of dense fibrous tissue, almost wholly devoid of nuclei.   There seems to be little doubt that the process was of a tuberculous character in a quiescent or arrested stage, although the nodules presented appearances not unlike those seen in medium-size gummata.   Third, surrounding the nodules just described there was a considerable lymphoid hyperplasia of the nodes.   In this portion of the nodes there was no especial increase in the connective-tissue stroma.   There had been but slight proliferation of the endothelium normally lining the reticulum, and the lymph nodules and perinodular lymph spaces as well as the capsule of the node were still fairly normal in appearance.   It is evident to me from this examination that there had been in the mesenteric as well as the retroperitoneal lymph nodes an actual and considerable increase in the normal elements, i. e., a compensating hyperplasia.

The adrenals.   The lymphatic hyperplasia, which was noticeable in some of the other organs, was particularly so in the suprarenals.   In the medullary portion of the gland were numerous aggregations of lymphoid cells, some of considerable size.   There was also some diffuse infiltra-

tion, and to a less marked degree there were smaller ac-
cumulations of spheroidal cells in the cortical portion.
Apparently the increase in size of the adrenals was due to
the presence of the lymphatic new growth.

Liver. The liver was increased to twice its normal size.
This increase in size and the dark purple color of the organ
noted at the autopsy were due almost entirely to a dilatation
of the liver capillaries between the liver cells. The dilated
and distended capillaries occupied almost as much space as
the parenchyma. The gall ducts were empty and collapsed.
The branches of the portal vein were commonly dilated.
The central vein was normal. The branches of the hepatic
artery showed no change. Glisson's capsule throughout the
liver contained a large number of cellular elements. The
cells were here sometimes packed together in little compact
masses, although throughout the whole of the capsule they
were abnormally abundant. They were contained in a
scanty, fibrillar stroma. The character of the cells varied.
The most abundant resembled leucocytes or lymphocytes,
and of these the small spheroidal mononuclear cell was the
most numerous. Some of them were polynuclear, having
from two to four nuclei, and some contained a single, large,
finely granular nucleus (eosinophile cells). In addition to
these forms there were many larger and flat cells, resembling
endothelium or epitheloid cells.

It is difficult to interpret this cellular proliferation of
Glisson's capsule. It would seem possible that it was an
early stage of biliary cirrhosis dependent upon compression
of the common bile duct from adjacent enlarged lymph
nodes. It seems also even more probable that this cellular
proliferation was of the nature of a lymphoid hyperplasia of
the pre-existing Arnold's lymph nodules, similar in character
to the hyperplasia of the lymph nodes of the mesentery and
retroperitoneum and adrenals, and similar to the same in-
crease in size of the solitary lymph nodules of the intestine
which was noted at the autopsy. If the latter assumption
is the correct one, we are justified in the belief that the

process is a physiological one tending to compensate for the absence of the spleen.

This case furnishes several interesting features: (1) The occurrence of wide-spread tuberculosis exhibiting marked healing phases in an individual who failed to experience the usual symptoms therefrom. (2) The occurrence of sudden aud fatal jaundice caused by obstruction of the common gall duct from an adjacent mass of enlarged lymph nodes. (3) The absence of the spleen in the adult without detriment to health. (4) The occurrence of physiological compensatory lymphoid hyperplasia of other parts of the lymphatic apparatus.

Regarding the question of the absence of the spleen in this case—namely, the possibility of this organ having been overlooked at the autopsy—I am firmly of the belief that this mistake did not occur. I am, however, prepared to admit, that had the condition of the splenic artery been carefully determined with reference to possible anomalies of its terminal or splenic branches, and had these branches been found wanting, my case would thereby have received additional confirmation. I am also mindful, as I was at the time of the autopsy, that the spleen under certain conditions becomes greatly diminished in size and might therefore be more easily overlooked. Thus Stengel[12] quotes Savill as having seen a spleen in an adult which weighed but 363 gm., whose dimensions were but $1\frac{3}{8}$ by $\frac{1}{8}$ by $\frac{1}{5}$ in. Kuhn[13] has seen in a woman, aged sixty-four, a spleen of even smaller dimensions. Therefore, had each of the hundred or more enlarged mesenteric and retroperitoneal nodes been examined microscopically, with negative results so far as finding in them spleen tissue, my case would still have additional support.

Whether or not there regularly follows after extirpation of the spleen a compensatory hyperplasia of other lymphatic organs has not yet been definitely settled. In none of the

recorded cases of absence of the spleen, unless it be those of Moroni and Olaechea, was there any mention of the condition of the lymph nodes. In my own case the lymphatic hyperplasia was well marked in the lymph nodes, liver, suprarenals, and intestines.

In the *American Text-Book of Physiology*, page 272, I find this statement : " An increase in the size of the lymph nodes and bone marrow is said to occur after extirpation of the spleen, but this is denied by others." I have found no recorded case of extirpation of the spleen which was followed by autopsy, but in animals, as shown by the experiments of Winogradow,[14] K. Foa Pio,[15] and Mosler,[16] there follows in most cases after extirpation of the spleen a very considerable increase in size of the lymph nodes and bone marrow. In one of Mosler's dogs, however, which was killed eleven months after extirpation of the spleen, there was not the slightest trace of any alteration having taken place in the remaining lymphatic structures as a result of the operation.

Several cases in the human subject have been reported, in which the condition of the lymph nodes, thyroid, and blood have been noted after successful splenectomies. O. Riegner[17] reports a case of a boy, aged fourteen, seven months after splenectomy was done for rupture of the spleen. Four weeks after the operation gangrene of the left leg developed, which required amputation. In the amputated leg several enlarged (bohnengrosse) lymph nodes were found. Later the axillary, cervical, and inguinal lymph nodes became enlarged, and reached the size of hazel nuts. Considerable increase in size of the thyroid also followed. The swelling of these organs gradually subsided in this case, so that seven months after operation those in the axilla were alone palpable. Ceci[18] has observed a temporary increase in size of the tonsils and thyroid after splenectomy. On the other hand, Czerny, Billroth, Albert, and Trendelenburg, quoted by Riegner, have failed to observe any enlargement of the lymph nodes, tonsils, or thyroid, after successful splenectomies.

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Stated Meeting, November 9, 1898.

T. MITCHELL PRUDDEN, M.D., PRESIDENT.

A CASE OF PRIMARY TUBERCULOSIS OF THE COLON IN A CHILD.

Dr. ROWLAND G. FREEMAN presented this report, together with the specimens. The patient had been passing bloody-

looking urine for a long time prior to being admitted to St. Mary's Hospital on September 28th. One week before it had been kicked in the abdomen. The child was poorly nourished. No specimen of urine could be obtained, because of incontinence. All over the right side of the abdomen there were tenderness and bogginess, and the abdomen was slightly retracted. The child had a convulsion shortly after admission, another later in the night, and three more the following day. Death occurred on the second day after admission. At the autopsy the examination of the heart, lungs, and liver was negative. The spleen was smaller than usual, and its capsule was shrivelled. The bladder was distended, so that it reached to one inch and a half below the umbilicus. Connecting the bladder with each kidney was a large, tortuous ureter, about the size of the colon. Pressure on the bladder distended both kidneys and ureters and caused the urine to be discharged from the urethral orifice. The lymph nodes adjacent to the caput coli were enlarged and, on section, were found to be cheesy and to contain creamy fluid. The caput coil contained a large tuberculous ulcer. Examination of the brain was negative. The interesting features of the case were the dilation of the bladder with hydronephrosis, the acute nephritis, and the tuberculosis of the caput coli and adjacent lymph nodes. The frequency of the occurrence of tuberculosis of intestinal origin, Dr. Freeman said, was a disputed point, men of wide experience holding radically different opinions. Sims Woodhead[1] states that he has seen a large number of cases in which the infection seemed to be from the intestine, and Cohnheim, Aufrecht, and Peterson[2] hold the same view. Schmidt[3] states that out of a series of three hundred and thirty-six autopsies at Freiburg there were six cases of primary infection of the mesenteric lymph nodes, while Eisenhardt, of Munich (quoted by Schmidt), in a series of

[1] Woodhead : *Medical Press and Circular*, 1888, xiv., p. 265.

[2] Wurzburg : *Therapeutische Monatsschrifte*, 1891, p. 18.

[3] Schmidt : *Inaugural Dissertation*. " Ueber die Häufigkeit der Tuberculose," etc. Freiburg, 1897.

one thousand autopsies found only one such case.   There had been very few such cases reported in New York.   Dr. Hodenpyl[1] had reported one in an adult in 1895 to this society, and Dr. Northrup[2] had reported one in an infant, and he had himself, reported previously two such cases— one with the late Dr. J. Lewis Smith to the Pediatric Section of the Academy of Medicine,[3] and the other to this society in 1896.[4]   In Dr. Hodenpyl's case there was no involvement of the lung.   In Dr. Northrup's case there was a generalized tuberculosis with but slight involvement of the lung, the origin of which had evidently been in the intestine. In the case presented by the speaker to the Pediatric Section of the Academy of Medicine no lesion was found in the lungs.   One bronchial lymph node at the bifurcation of the trachea contained tuberculous nodules, but no fluid contents. The mesenteric lymph nodes adjacent to the caput coli were markedly enlarged, and some of them contained brokendown cheesy material.   In his second case there was an ulcer of the caput coli, and beneath it was a large tuberculous lymph node.   However, as there were lesions disseminated through the mesentery, the mediastinal and bronchial lymph nodes, and lung, the exact origin of the disease was somewhat a matter of conjecture.

A CASE OF HODGKIN'S DISEASE TERMINATING WITH LEU-COCYTOSIS.

By HARLOW BROOKS, M.D.

THE patient was A. F——, female, aged thirty-one years. Born in Hungary, of Jewish parentage.   She entered Bellevue Hospital on September 27, 1898, during the service of Dr. Nammack, to whom I am indebted for the following notes.

The condition of the patient was such that no previous

[1] Hodenpyl : *Medical Record*, 1895, i., p. 313.

[2] Northrup : *Proceedings of New York Pathological Society*, 1890, p. 42.

[3] Smith and Freeman : *American Medical Surgical Bulletin*, 1895, p. 1,461.

[4] Freeman : *Proceedings of New York Pathological Society*, 1896, p. 105.

history could be obtained from her, and the relatives were only able to state that the patient had been sick for a long time and that she had been treated at various city dispensaries.

"PHYSICAL EXAMINATION.

"Patient very poorly nourished. Extreme subjective and objective dyspnœa. Expression anxious; lips blue. Great restlessness. Skin cold and clammy. Abdomen somewhat enlarged. Legs œdematous. Inguinal and cervical nodes enlarged.

"Lungs: Auscultation was difficult on account of loud fluid râles over the entire pulmonic area. The breathing and voice is broncho-vesicular behind, and the same but in less degree anteriorly. There is dulness on percussion over the posterior region.

"Heart: The apex beat is hardly visible, but on ausculta-tion it is found in the fifth space, nipple line. There is a faint systolic murmur heard at the apex area. The pulse is rapid, soft, and weak. Considerable arterial change is evident.

"The liver dulness is increased, extending down to near umbilicus. The inferior border is palpable and is found to be smooth and sharp. The area of splenic dulness is enor-mously enlarged, and extends down to the left iliac crest. Palpation shows the tumor to be smooth and regular in contour.

"Temperature, 101.2° F. pulse, 88; respiration, 34.

"Urine: Amber colored, cloudy; specific gravity, 1.023. Granular casts; non-characteristic epithelial cells. No albumen; no sugar.

"The patient's distress and dyspnœa were controlled by the means of morphia. The temperature varied from 100.5° to 102.7° F. She became very restless and noisy, and finally died on September 30th."

Some time after the death of the patient I found that, previous to her admission to Bellevue, she had been under

treatment at one of the dispensaries, where several examinations of her blood had been made, and the two following blood counts were furnished me through the kindness of Dr. William Berkeley :

"May. 10, 1898 : Leucocytes—polynuclear neutrophiles, 32.5 ; large lymphocytes, 41.5 ; small lymphocytes, 24.8 ; eosinophiles, 1.2.

"May 12, 1898 : Red blood cells, 2,900,000 ; leucocytes, 6,700.

"Died, September 30, 1898. Autopsy, October 1, 1898."

The body is poorly formed, and it is more of the masculine than feminine type. The feet and ankles are œdematous. The thorax is bell-shaped. The abdomen is slightly distended. Emaciation is marked. The pupils are equally dilated. The skin, which is apparently very thin, is of a peculiar whitish-blue color. The mucous membranes are anæmic. Rigor mortis is absent.

SECTION.

The amount of panniculus adiposus is small, and it is of a grayish-yellow color. The marrow of ribs is light in color, but presents no particular gross abnormality. The lymph nodes along the course of the internal mammary arteries are enlarged somewhat. There are dense old adhesions of both pleural cavities. The pericardium shows thickened patches, especially over the right auricle and ventricle. The heart is enlarged. The left ventricle contains a small amount of post-mortem clot. The right auricle and ventricle are distended with a cast of ante-mortem clot. Both of the right chambers show evidences of considerable long-standing dilatation. The heart muscle is fairly firm, but it is somewhat elastic and of a light-brown color. The aortic segments are slightly thickened ; otherwise the valves of the heart are in a very normal condition, save that the orifices are in general distended. The coronary arteries show a moderate thickening of the intima. Otherwise the examination of the heart is negative. Weight of heart, thirteen ounces.

The lungs are enormously congested posteriorly, while the anterior portions are emphysematous. The connective tissue is greatly increased throughout the entire lung structure, and especially in the lower lobes. The right middle lobe shows complete atelectasis, apparently entirely due to the enormous increase of its connective-tissue elements. There is a calcareous nodule, one centimetre in diameter, situated in the left apex; it is surrounded by a dense capsule of connective tissue, and is the only lesion which could be taken as of tuberculous origin in either lung. Certainly, then, the extensive fibroid changes are due to some other cause than a chronic or residual pulmonary tuberculosis.

The mucous membranes of the trachea and bronchi are congested, and the lumen of the tubes contains a considerable quantity of muco-purulent secretion. The thyroid gland is small, and its tissues show nothing abnormal. There are no abnormalities in the configuration or structure of the tongue, epiglottis, or larynx.

The lymph nodes of the cervical chains, and especially those located just at the root of the lungs, are greatly enlarged, sufficiently so to interfere to some slight degree with the normal lumen of the trachea and the larger bronchi; the peribronchial lymph nodes following into the substance of the lungs are also more or less enlarged. On section these enlarged nodes are found to be generally of a reddish-gray color, though some of the larger ones are more of a purplish hue, being moderately congested; still others show a quite extensive anthracotic pigmentation. The tissue of the nodes shows a very considerable interstitial increase, so that the cut surface of the node is firm, and the substance is scraped off with difficulty. The nodes contain no necrotic or tuberculous areas, and the enlargement is plainly not of an acute inflammatory nature.

The capillaries of the peritoneum are congested, but the surface of the membrane is glossy and there are no evidences of acute inflammatory changes. The omentum is thickened

and retracted. The mesenteric lymph nodes are enlarged, some to a considerable degree. Their structure presents the same characteristics as those already noted in the peritracheal nodes.

The liver is enlarged. It weighs six pounds six ounces. The capsule is thickened and opalescent ; it has the appearance of being under tension, and when it is incised the liver tissue rolls out from the line of section. The liver tissue itself is firm and solid. The lobules are plainly marked, being of a yellowish-gray color, while the interlobular substance is congested and deep purple in its color. The paths of connective-tissue stroma are apparently considerably thickened.

The gall bladder contains about two hundred cubic centimetres of slimy, burnt-umber-colored bile. The duct is patent.

The spleen is greatly enlarged. It measures thirty centimetres in length, twenty centimetres in breadth, and has an average thickness of eight centimetres. The capsule is thickened and is under considerable tension. The tissue is very firm and is dark brown in color. The Malpighian corpuscles are not evident. The blood-vessels are very much congested, but the cut surface does not drip blood or serum. The splenic tissue is not easily removed on scraping the cut surface. Apparently the increase in size is, mostly at least, dependent on the great hyperplasia of the connective-tissue elements of the organ. Weight, four pounds ten ounces.

The pancreas is small and its tissue presents no evident pathological lesion, save that the lymph nodes along the course of the main artery are enlarged.

The adrenal bodies are small. They are deeply pigmented and the medulla is soft.

The kidneys are somewhat enlarged. The capsules are generally adherent. The cortex is thin and irregular. The medullary portions shows a quite marked congestion, and the general color of the tissue is a purplish-gray, but in the cortical portions numerous yellowish blotches are seen. The consistence is firm. The main branches of the renal

arteries show a quite marked degree of arterio-sclerosis, and the smaller vessels show a marked proliferation of the surrounding connective tissue. United weight of the kidneys, ten ounces.

The ureters are natural.

The bladder is contracted, but contains a few cubic centimetres of purulent turbid urine. The cystic mucous membrane is greatly congested, and shows in places a loss of substance.

The stomach is dilated. It contains a small amount of fluid. The mucous membrane is greatly congested and in places atrophic.

The small intestine containes a soft fecal material.

Its mucous membrance is generally congested, and the solitary follicles and Peyer's patches are enlarged, but not inflamed.

The caput coli shows no abnormality. The vermiform appendix is about of the usual size; it has a complete mesentery and presents no lesion. The large intestine is collapsed, and contains but a small amount of soft normal fecal matter.

The ovaries are small and atrophic. Their gross structure shows no variation from the usual ; recently ruptured follicles are not to be seen. The tubes and the pampiniform plexus are normal. The uterus is small, measuring but six centimetres from fundus to cervix. The cervix presents the scars of an old stellate laceration. The arbor vitæ of the cervical canal is indistinct. The mucous membrane of the uterine cavity is anæmic and atrophic. The vagina shows nothing aside from ordinary atrophic changes.

The intima of the large arterial trunks of the abdominal and pelvic cavities shows a quite extensive arterio-sclerosis.

The retroperitoneal lymph nodes are enlarged, and show the same changes already noted. The nodes situated about the saphenous opening are also enlarged to a considerable degree, but below this point the lymphatic enlargement appears to be very slight.

ANATOMICAL DIAGNOSIS.

Interstitial pulmonitis; hypertrophic nephritis; hypertrophic hepatitis; chronic lymphangitis and acute cardiac dilatation, the last named being probably the direct cause of death.   The possible diagnosis of Hodgkin's disease was made, but was not substantiated until the microscopic examination had been made.

MICROSCOPIC EXAMINATION.

Lymph nodes: Sections of the enlarged lymph nodes show the enlargement to be due to a vast increase of the cellular elements of the tissue.   The arrangement into cortex and medulla, seen in normal lymph nodes, is obliterated, and compact masses of lymph cells are found filling the entire section.   Mingled with the small mononuclear cells are found a good many cells, spherical in shape, about four or five times the diameter of lymphocytes, and containing a small round nucleus.   The protoplasm of these cells is frequently loaded with coarse brown pigment granules. Vessels are very numerous in the sections, and they are, as a rule, packed with blood cells.   In some, but not all, of the sections extravasations of red blood cells are found.   All the sections show a very marked increase in the connective-tissue elements of the nodes.

Spleen: The sections of the spleen show the spaces normally found between the Malphigian tufts to be so infiltrated with lymph cells as to render the detection of the tufts almost impossible.   The sections also show a considerable congestion of the blood-vessels and spaces.   There are a great many young connective-tissue fibres seen everywhere throughout the sections.

Lungs: The sections show an enormous increase in the connective tissue, which has resulted in the complete obliteration of the pulmonic structure in large areas.   In some places air vesicles are still to be seen, but with greatly thickened wall and filled by an exudate of cells, the cyto-

plasm of some of which is filled with pigment substance. Areas of lymph-cell infiltration are quite numerous, and are found in every part of the section. The numerous large blood-vessels which are included in the section are for the greater part filled with blood cells, among which it is seen that the white blood cells are in large proportion, and that of these the small mononuclears make up over fifty per cent.

Heart : The connective tissue of the heart is increased. The muscle cells are atrophied and their nuclei are irregular and show occasional mitotic figures. The striation is quite evident in most of the cells, but the protoplasm in many contains a large amount of coarse brown pigment substance, which is found for the greater part in the immediate region of the nucleus. There are a few small areas of lymphatic infiltration, mostly located in close proximity to the blood-vessels. The vessels included in the heart sections show the same preponderance of the lymphocytes.

Liver : The liver shows an increase in its connective-tissue elements, though not of great degree, excepting in the immediate region of the interlobular structures, where the proliferation is much more marked. The liver cells are in general atrophied, and the cytoplasm of nearly all shows a parenchymatous and fatty degeneration. The nuclei of most of the cells are intact. Scattered throughout the sections, sometimes in the neighborhood of vessels and sometimes not, are found small groups or patches of lymph cells. These nodes are not surrounded by any evidences of acute inflammation, though the connective tissue in such areas is usually more increased than elsewhere, and is frequently seen to have a somewhat capsular arrangement. The blood-vessels found in these sections show a great proportionate increase of the leucocytes, with the lymphocytes in by far the greatest preponderance.

Pancreas : The stroma of the pancreas is moderately increased, and a few patches of lymphoid infiltration are found in it ; otherwise the structure appears to be normal.

Kidneys : The kidney sections show an extensive paren-

chymatous degeneration of the cells of the convoluted
tubules.   In many places this is combined with a fatty
degeneration of considerable degree, and the cells of a good
many of the tubules are almost completely destroyed, the
lumen of such tubules being filled with cell débris.   There
are a few small patches of lymphoid infiltration in the
neighborhood of the columns of Bertini, but they are neither
numerous nor particularly characteristic.   The perivascular
connective tissue shows a moderate hyperplasia.   The blood-
vessels here show the same picture as those already described
in the other viscera.

The extent of the post-mortem investigation was some-
what restricted by the demands of relatives, and as the
autopsy was not obtained until twenty-four hours after death,
when post-mortem infection might have become extensive,
no bacteriological examination was made ; hence the case is
of no importance, in so far as tending to prove or disprove
the very probable infective theory of the causation of
Hodgkin's disease.

The case represents a fairly typical one of the disease,
though the involvement of the viscera by the lymphatic in-
filtration is of rather less degree than I have seen before in
cases presenting so marked an anæmia, and so extreme
symptomatic manifestations of the disease as did this case.

The symptoms present just before death, and the mode of
death, together with the general pathological findings, seem
to be those commonly present in this condition.

The chief point of interest presented by this case is the
fact that the diagnosis of Hodgkin's disease was made on
May 12th, when the glandular enlargement was already quite
pronounced, on the sole differential point between Hodgkin's
disease and leukæmia, that the number of leucocytes present
in the blood at this time was not above the normal, and that
the relative proportions of the leucocytes one to another
was practically normal.   Yet in the arteries examined after
death it was found that a considerable lymphatic leucocyto-
sis was present, which must have developed between the

date of the last blood examination and the time of death. It is to be very much regretted that no blood examination was made when the patient first entered our wards at Bellevue, but circumstances were such at the time as to preclude this, and as death took place before it was expected this important link in the history was lost ; nevertheless, the pictures presented in the sections through blood-vessels seem to render the presence of a small, mononuclear leucocytosis beyond question.

Cases of Hodgkin's disease terminating with leucocytosis are not so very uncommon ; instances are reported by Troje, Cohnheim, and many others, who thence conclude that since leucocytosis is sometimes or even often found as a symptom of Hodgkin's disease, it is hardly logical to consider Hodgkin's and lymphatic leucocytosis as distinct conditions.

The general symptomatic and pathological manifestations of the two diseases are the same, and an absolute differentiation on the single and variable symptoms of leucocytosis which may be present or absent in either, or present at one time and absent at another, is far from logical.

Lympho-sarcoma is now quite commonly thought to be but a more active and virulent form of the same general disease of which we consider Hodgkin's to be a type ; indeed, it seems very proper that Hodgkin's disease, lympho-sarcoma, and lymphatic leukæmia should all be classed as one disease, differing only one from another in the prominence given to some symptoms or set of symptoms. Accepting the unity of these processes, as many do, it would seem well to apply to the general conditions the name—first, I think, used by Trosseau—of " adenie."

THREE CASES OF LYMPHO-SARCOMA OR HODGKIN'S DISEASE.

Dr. F. C. WOOD reported these cases. He said that *the first patient* was a large, well-nourished man, who had entered the hospital with a complete paraplegia, loss of power of both sphincters, and with a very vague history. The autopsy showed that the bronchial lymph nodes were enormously

enlarged, and that the disease had involved the bodies of the vertebræ, the vertebral canal, and the spinal cord. There was one small nodule in the liver. The retroperitoneal lymph nodes were not enlarged, and the nodes in the neck, axilla, and groin were not affected. The involvement of the tissue around the lymph nodes made it seem proper to call the case one of lympho-sarcoma. In *the second case*, the specimens had been removed by operation from a poorly nourished child of five years, under the supposition that the lymph nodes were tuberculous. Microscopical examination showed that the nodes were simply hyperplastic. In two or three weeks there was a recurrence, and all the superficial nodes rapidly enlarged. The blood showed a marked diminution in the hæmoglobin. The specimens presented from *the third case* were lymph nodes of the neck, which had been removed from a colored woman who had been in St. Luke's Hospital for about two months. About four months before admission she had noticed a swelling of the right side of the neck. This had increased in size, and she had lost flesh and strength rapidly. The enlarged lymph nodes extended from the zygoma to the clavicle. Microscopical examination of the blood showed nothing but an extreme anæmia. There was marked œdema of the lower extremities. The autopsy revealed only enlargement of the lymph nodes of the right side of the neck. These nodes could be rolled around in the loose connective tissue, and, on section, were opaque and firm, and had no cheesy centres. The retroperitoneal lymph nodes in some places were calcareous. The spleen in this case was quite small. There were a few small nodules in the lung, apparently sarcomatous. There was also a small, firm, whitish nodule in the liver. The kidneys were normal. On section of the lymph nodes their centres were seen to be the seat of a necrosis. Around this was a small ring of lymph cells, and within this a few giant cells and tubercle bacilli. There were nodules in the lungs, showing tuberculous change. The speaker said that the enlargement was too rapid for an ordinary tuberculosis, and the process in the lung was so old

that the nodules were calcareous. The question then arose as to whether the case was one of tuberculosis or of Hodgkin's disease with an accidental infection. A number of cases had been described under the name of Hodgkin's disease in which there had been a rapidly fatal termination, associated with enlargement of the lymph nodes in certain regions, and in which tubercle bacilli could be demonstrated. In these cases there was no tendency to general tuberculous infection.

Dr. LEWIS A. CONNER said that he hoped an explanation would be forthcoming which would enable a proper classification to be made of these puzzling tumors. At the New York Hospital there had been two cases in the past year, neither of which had corresponded with the classical description of Hodgkin's disease, and in neither had there been any of the usual gross or microscopic appearances of tuberculosis. The glands had been individually enlarged, and, on section, had presented a waxy, translucent appearance and had been of fair consistency. In both instances the disease had lasted a considerable time. In one there were immense masses of glands in the neck only, but each was distinctly outlined. Under the microscope there had been found lymphoid cells with distinct stroma between them.

Dr. WOOD said that he had seen one similar case in which the lymph nodes had been removed by operation, and, on section, there had been nothing found but a hyperplasia. However, on inoculating a guinea-pig with some of the lymph nodes, the animal had died of tuberculosis. The enlargement of the glands had occurred too rapidly—within about three weeks—so that it seemed probable that the infection had been rapid, and the glands had been removed before the occurrence of characteristic tuberculous changes.

Dr. HARLOW BROOKS said that he had noticed in a recent report of an English bacteriologist concerning observations on the lymph nodes in Hodgkin's disease, that this observer had found a great many germs in the nodes, most of them being either streptococci or members of the colon

group. The opinion of this investigator seemed to be that these were either post-mortem or terminal infections. The tubercle bacillus had been found in a good many of the reported cases, but these had not been included under the classification of Hodgkin's disease. Where the autopsy had been made fairly early no growth had been observed.

PERFORATING ULCER OF THE STOMACH WITH HOUR-GLASS CONTRACTION.

Dr. Leon Le Wald reported this case. The patient was a woman of forty-three years who had been admitted to hospital with evident signs of general peritonitis. A very indefinite history only could be obtained, but it was stated that she had suffered from indigestion and pain in the region of the stomach for about three years. At the autopsy the abdominal cavity was found to contain a large quantity of purulent fluid. In the anterior wall of the stomach, just slightly anterior to the lesser curvature and about the middle of the stomach, was a perforating ulcer. It measured four millimetres in diameter, had very sharply cut edges, and felt somewhat indurated. The stomach was divided into two nearly equal portions by a constriction situated to the pyloric side of the ulcer. There were adhesions between the posterior wall of the stomach and the pancreas, and between the stomach and liver and transverse mesocolon. On opening the stomach, there was an aperture discovered between the two portions which just admitted the tip of the finger and measured thirteen millimetres in diameter. Coming off from the cardiac side of this constriction was a small pouch which led to the perforation on the anterior wall of the stomach. The area surrounding this was indurated, but microscopical examination of this portion revealed only a chronic inflammatory process. From the presence of the surrounding adhesions and from the general appearance it did not seem probable that the hour-glass contraction of the organ was congenital ; it was more probable that a former ulcer in the process of healing had caused a drawing up of the stomach wall.

AN UNUSUAL LESION OF THE INTESTINE IN TYPHOID
FEVER.

Dr. LE WALD also reported this case—that of a male, twenty-eight years of age, who was supposed to have died in the third week of a typhoid fever that had been contracted at the Montauk Point camp. The clinical record was that of a severe typhoid fever. The blood gave the Widal reaction. At the autopsy very typical lesions were found in the small intestine. There were also ulcers with elevated edges extending throughout the large intestine, even down to the anus. The mesenteric lymph nodes were enlarged, and some of them were suppurating. The unusual lesion in the case, however, was the extensive involvement of the vermiform appendix. The organ was enlarged to the size of one's index finger. It was of usual length, but measured two inches in circumference toward its base. On opening it, the lumen was found nearly obliterated, due to the marked infiltration and swelling of the mucous membrane. The infiltration also extended into the mucosa and and muscular layers. A number of small superficial ulcerations of the mucous membrane were present, particularly toward the base. The lesion was considered important as an explanation of the occasional cases of typhoid fever which give abdominal symptoms so closely simulating ordinary appendicitis. Only recently a patient had been operated on at Bellevue Hospital for appendicitis, when the incision revealed the presence of typhoid fever with an involvement of the appendix similar to the present case.

Dr. E. K. DUNHAM said that he had examined microscopically some of the lesions in the intestine and other organs in this case, because it had seemed to be such a typical example of typhoid fever. His attention had been called to the observations of Dr. Mallory in typhoid fever. This investigator had studied the lesions in a number of cases, notably one in which death had occured before ulceration had taken place, and had arrived at the conclusion

that the lesions in typhoid fever were essentially prolifera-
tive; that the endothelioid cells, as he called them, of the
lymph nodes in the intestine and elsewhere, and the en-
dothelium of the veins and lymphatic vessels proliferated
during the course of the disease ; and that as a result of this
proliferation phagocitic cells of large size were produced,
which wandered into the lymphatics and blood-vessels and
destroyed the ordinary leucocytes and red-blood cells. In
this way it seemed possible that they might clog some of the
vessels and cause local necrosis. Dr. Dunham said that he
had seen some of the specimens prepared by Dr. Mallory,
and they were very suggestive and instructive. Certainly
some of the phagocytes were crowded with red-blood cor-
puscles, and others with leucocytes and lymphocytes. Al-
though the specimens received from the case now under
discussion had been very much altered, it had seemed to him
that in the sections which he was about to exhibit to the
society there were similar appearances. Dr. Mallory, in his
publication of last April, had likened typhoid fever to tuber-
culosis, claiming that in tuberculosis the proliferation was
focal, while in typhoid fever it was general.

This difference was explained by the fact that the poisons
produced in typhoid fever were diffusible and absorbable,
whereas in tuberculosis they were more nearly confined to
the region in which the bacillus is found.

Dr. Dunham then exhibited under the microscope a series
of six sections illustrating the points already alluded to.

Dr. HODENPYL said, regarding the swelling and ulceration
of the lymphatic nodules in the appendix in typhoid fever,
that he had seen this condition twice, but without any
symptoms which could be regarded as those of appendicitis.
Looking over the literature some time ago, he had found
that there had been a number of such cases reported, but in
none of them apparently had there been any symptoms of
appendicitis. The same held true of tuberculous ulcers of
the appendix which are observed from time to time.

Dr. BROOKS said that a member of General Lee's staff had

made many autopsies on typhoid fever patients dying in the camp near Jacksonville. This gentleman, Dr. Bolling Lee, had stated to him that one of the patients had presented the symptoms and physical signs of an acute appendicitis, but the surgeon had refused to operate. At the autopsy the appendix was found to have been perforated by an ulcer which appeared to be typhoid. He had also found in these patients very commonly large ulcerated areas in the intestine, which were thought to be due, not to the typhoid fever, but to a phagedenic condition associated with malnutrition.

A CASE OF PRIMARY TUBERCULOSIS OF THE CERVIX UTERI.

By FRANK S. MATTHEWS, M.D.

SINCE the publication of the work of Williams [1] and of Penrose and Bryen, [2] much work has been done and many articles written to show the frequency of tuberculosis of the female genital tract. Williams's investigations showed eight per cent. of all tubes removed for inflammatory disease to be tuberculous. Penrose and Bryen, in a routine examination of all tubes removed by them for inflammatory disease, found nine cases of tuberculosis of the tubes in fifty-two cases, or seventeen per cent. A fact to which they call special attention is that in a large percentage of their cases neither from the clinical history nor macroscopical appearances could a diagnosis of tuberculosis be made.

Tuberculosis of the endometrium is also encountered in a considerable number of cases. In most of them the process has extended to the endometrium from the tubes. In a small number of cases the tuberculosis is primary, so far as the genital organs are concerned in the endometrium. But whether the uterine mucosa be involved primarily or secondarily, the cervix uteri very often escapes the infection. It has been suggested that the solutions of continuity occurring

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[1] *Johns Hopkins Reports*, vol. iii., 1893.

[2] *American Journal of the Medical Sciences*, November, 1894, and March, 1896.

with menstruation and labor render the body of the uterus more prone to tuberculous infection than the cervix. A number of cases, however, have been reported, in which the cervix uteri was primarily infected. J. D. Williams[1] reports two cases. Emanuel[2] and E. Frankel[3] each report a case. In all of these cases there were extensive tuberculous lesions in distant organs. Brief reviews of these cases may be found in the volume on *Tuberculosis of the Genito-Urinary Organs*, by Nicholas Senn.

More recently a case has been reported, in which the lesion in the cervix was the sole tuberculous one. The following review of the case is taken from the *Centralblatt für allgemeine Pathologie u. pathologische Anatomie*, October, 1898.

" E. Kaufmann[4] : Autopsy on a woman, aged seventy-nine. Cervix eroded, shows infiltrated growth with necrosis of tissue and formation of polyps.

" Microscopical examination shows epitheloid and giant cells with granulation tissue and cheesy degeneration. Tubercle bacilli demonstrated. Autopsy showed this to be a case of primary isolated tuberculosis of the cervix uteri. Uterine body small. Tubes, ovaries, and lymph nodes, normal."

We add the following case of tuberculosis of the cervix, with, so far as could be clinically determined, no other tuberculous foci. In spite, however, of absent clinical evidence, the probabilities would be strong of the existence of other foci.

E. H——, negress, single, aged twenty-two years. Admitted to Roosevelt Hospital, service of Dr. George M. Tuttle, April 18, 1897. Menstruated first at fifteen, at first irregularly ; later every three weeks. Duration, one day, and scant. Considerable dysmenorrhœa. Never pregnant.

[1] *Medical Press and Circular*, Sept. 5, 1894.

[2] *Zeitschrift f. Geburtshülfe u. Gynäkologie*, Bd. xxix., S. 135.

[3] *Centralblatt f. Gynäkologie*, No. 39, 1896.

[4] *Zeitschrift für Geburtshülfe u. Gynäkologie*, Bd. xxxvii., S. 119.

Present illness : Dysmenorrhœa increasing for past three years, and during same time has suffered from colicky hypogastric pains. Has a profuse muco-purulent and blood-stained discharge. Now suffers from headache, backache, and lack of energy. Bowels costive. Temperature, 99.6° F. ; pulse, 90. Urine, acid ; specific gravity, 1.023 ; contains a faint trace of albumen.

Examination : Cervix large, worm-eaten, and its cavity excavated. Bleeds easily. Growth has extended to vaginal wall and involved it, especially on the anterior wall. Left tube and ovary easily felt and appear normal. Right appendages slightly enlarged. Broad ligament thickened. Fundus enlarged and movement restricted.

On April 26th, under ether anæsthesia, the ovaries, tubes, and uterus, together with the diseased portion of vaginal wall, were removed by vaginal hysterectomy. Previous to the hysterectomy the cervical cavity was curetted and packed with gauze. The broad ligament was ligated with catgut. Adhesions were found between the appendages and intestines. The pelvic cavity was packed after Mickulicz's method.

Convalescence was retarded by a severe secondary hemorrhage on the following day.

May 2d, wound free from infection.

May 6th, sinus two inches deep.

May 20th, patient allowed up.

May 31st, a granulating spot at vaginal vault.

June 14th, discharged healed.

Pathological report : The broad ligaments are thickened ; ovaries, small and adherent ; right tube distended to above the size of a lead-pencil ; left tube of normal size. The uterine body not enlarged. Its cavity contains a dark bloody material. The cervix is enlarged to at least twice its normal size, and contains a cavity as large as a hickory nut—the result of curetting as a preliminary step to the hysterectomy. The mucous membrane of the vagina adjacent to the cervix and removed with it is deeply ulcerated.

Microscopical examination shows the interior of the cervix to be the seat of a diffuse tuberculous inflammation.   There are tubercle tissue, cheesy degeneration, and giant cells. Deep in the muscular wall of the cervix there are discrete miliary tubercles.   The broad ligament shows œdema and moderate exudative inflammation, but no tubercle.   The body of the uterus has a slightly enlarged cavity distended with blood and débris.   Its mucous membrane is thinner than normal and almost entirely destitute of glands.   The epithelial lining is fairly well preserved, and there are no evidences of tubercle above the internal os.   The right tube shows a similar condition—a cavity distended with blood and débris, a mucous membrane whose folds have disappeared at its inner end and whose lining epithelium is well preserved.   The right tube and ovary contained no tuberculous lesions.   The left tube, which was not preserved for microscopical examination, was said not to have been enlarged and distended, as was the right.

DUODENAL ULCER.

Dr. LEWIS A. CONNER presented an ulcer of the duodenum removed from a man twenty years of age, who had entered the Hudson Street Hospital with the history of having been severely ill for less than twenty-four hours.   There were evidences of peritonitis, and, suspecting appendicitis, the abdomen was opened over that organ, but the appendix was found to be normal.   There was a general peritonitis with gas in the peritoneal cavity, but the condition of the man was so bad that no further search was admissible.   He died a few hours later.   The post-mortem showed a perforation in the anterior wall of the duodenum, immediately below the pylorus, and in the most favorable situation for operative interference.   Within the last four years there had been at that hospital five cases of duodenal perforation, as well as one perforation of a gastric ulcer and another from an ulcer in the upper part of the jejunum.   In four of the cases the ulcer had been on the anterior wall and in the remainder on

the posterior wall.   In one case there was an ulcer in the stomach as well as in the duodenum.   In most of the cases the ulcers were very close to the pyloric ring.

CHRONIC ULCER OF THE STOMACH.

Dr. E. HODENPYL presented two such cases.   *The first of these* was a man thirty-five years of age, who had been a very heavy drinker except during the last year, when he had been more temperate.   Seven days before death, and without any warning, he had a very profuse hemorrhage, which almost exsanguinated him.   There was a well-marked nephritis present on admission to the hospital, and he died seven days later in a uræmic attack.   At the autopsy, aside from the chronic diffuse nephritis and marked œdema of the meninges of the brain, the only noteworthy feature was a a circular ulcer, with sharply cut edges, on the upper curvature of the stomach about one inch from the pylorus.   On the base of this ulcer were two rather large arteries with open mouths.   *The second case* was that of a woman, fifty-one years of age, who had been well up to two months before death.   She complained of increasing weakness and occasional attacks of vomiting.   On admission to the hospital, there was some tenderness over the epigastrium, and her temperature was 99.5° F.   The autopsy revealed an intense general peritonitis, with fully two quarts of the stomach contents in the abdominal cavity.   There were numerous pockets of pus all over the abdominal cavity, shut in by firm adhesions, most of which were fibrinous, but some were distinctly organized, indicating that the peritonitis had existed for a considerable time.   The cause of this subacute peritonitis was a very large perforation in the anterior wall of the stomach, and two inches from the pyloric opening and near the lesser curvature.   The perforation was through the base of an ulcer having sharply cut edges, one inch in diameter, which had apparently occurred some time previously.

Dr. JAMES EWING said he was reminded of the case of a woman who had entered the Roosevelt Hospital with symp-

toms of perforation of a gastric ulcer. She remained in a critical condition for one month, with symptoms of peritonitis. At the autopsy it was found that the first perforation had caused a peritonitis, involving the surface of the stomach and the greater omentum ; that the peritonitis had been limited by the limits of the omentum : and that an abscess cavity had formed, which had been shut off from the rest of the abdominal cavity.

INTRA-NASAL GROWTHS.

Dr. ROBERT C. MYLES presented two growths from the nose. The first, which seemed macroscopically to be a papilloma, had been removed from the inferior turbinæ of a man. According to recent investigation, Dr. Myles said, these growths were claimed to be simple hypertrophies. The other growth, from a girl of twelve years, was three inches in length. It grew from the under surface of the middle turbinæ and from the ethmoid bone, and following the channel of the middle meatus, passed into the rhino-pharynx. The tumor was hidden from view in the nose, the only part visible being that in the throat. It presented a peculiar chain-like appearance, apparently myoxmatous.

ULCERATION OF BOTH STOMACH AND DUODENUM, WITH PERFORATION OF THE SPLENIC ARTERY.

Dr. LE WALD presented specimens from a case in which there was ulceration of both stomach and duodenum. They had been removed from a girl of twenty-two years. Two years ago she had had an attack of pain in the stomach and had vomited blood. She had been recently admitted to the hospital because of indigestion. The stools were noticed to be tarry, and she vomited blood in considerable quantity until death occurred, about six hours after entering the hospital. At the autopsy it was found that the stomach and intestines were filled with blood, and there was an ulcer, one inch in diameter, on the posterior wall of the stomach, having characteristically clean-cut edges, which were adherent to

the pancreas. At the bottom of this ulcer was an opening
into the splenic artery, and this had been the source of the
fatal hemorrhage. There was also an ulcer in the duodenum,
just below the pyloris, which had healed, and which exhib-
ited a certain degree of contraction of the walls of the duo-
denum, thus illustrating the method of production of the
hour-glass contraction of the stomach in the case presented
earlier in the meeting.

Dr. HARLOW BROOKS presented a fresh specimen of ulcer
of the stomach.

PRELIMINARY COMMUNICATION ON THE BIOCHEMISTRY
OF THE BACILLUS TUBERCULOSIS.

By PHŒBUS A. LEVENE, M.D.

AFTER the different specific microbes for different diseases
were found, the question arose, How do they produce the
disease ? And the chemical theory was to become the pre-
vailing one. The microbes are not simple parasites that are
robbing an organism of its nourishment; they are attacking
by means of poisons—toxins. What is the nature of those
toxins? Where do they originate ? were the next questions
of human pathologists.

The products of metabolism of the micro-organisms were
the first to attract attention of students, and a number of
toxic substances of different chemical natures were soon
discovered among them.

Soon, however, facts were established which showed that
the body substance of micro-organisms is toxic *per se*. So
Wissokowitz found that the substance of anthrax bacillus
produced abscesses. Buchner saw the same effect of the
pneumo-bacillus. But most interesting and striking were the
observations of Professor Prudden and Dr. Hodenpyl, that
the dead tubercle bacilli are able to produce in the organism
of animals appearance very similiar to those seen in ordinary
tuberculosis. The same experiments were then repeated by
Straus and Gamaleia and by a good many investigators in

Germany, and the main conclusions corroborated by all the authorities.

This fact being established, the next question was, what chemical part of the micro-organism was it that was toxic? Buchner was first to answer the question *a priori*, naming the proteid matter of the micro-organism as the cause of their toxic effect. But if so, why do only these proteid bodies, in distinction from all other proteids, possess such a peculiar action? Are they different in their chemical nature? Nencki and his students were first to investigate the question, and they found some substances of proteid nature that differed considerably from all other proteids, and which they called mycoproteids. But the methods they employed were such as would change the true nature of any proteid, and their conclusions leave enough room for objections. The opinions of later workers were quite contradictory to those of Nencki. Of all of them, however, only very few succeeded in obtaining true genuine proteids from the body substance of bacteria. Hellmich, in Franz Hoffmeister's laboratory, was the first to obtain a coagulable proteid from a water bacillus, and later Hoffman precipitated by means of alcohol a proteid from the water extract of tubercle bacilli.

Nishimura in Rubner's laboratory was investigating into the nature of the nucleins of microbes, but failed to extract the nuclein itself and had to limit his work to the products of their decomposition, the nucleo-bases. This work was important, so far as thereby to establish the fact that by the nature of their neucleins the bacteria do not differ from any other living cells. Finally Gileo-Galeotti succeeded in extracting from different bacteria, by means of weak alkali, a nucleo-proteid with one per cent. of phosphorus and twelve per cent. of nitrogen.

It was our task to examine the chemical and toxicological nature of the proteids of tubercle bacilli, and this work, the result of which I am here going briefly to report, was carried out during the past summer in the Saranac laboratory of Dr. Trudeau, in collaboration with Dr. E. R. Baldwin. Our first

aim was to use such methods in our work as to attack the original nature of the body substance as little as possible. Further, in order to be certain that the proteids that we were to obtain were not contaminated with those of the media, we used mineral media, taking for the necessary supply of nitrogen the bacilli asparagin, and for the carbon supply mannite and glycerin. Straight from the flasks the growths were transferred on a suction funnel, the culture media filtered off and the residue washed several times with very small quantities of water. It was then dried *in vacuo* over sulphuric acid, to dryness. The dry bacilli were then weighed and transferred into a porcelain mill and left there to grind for about two or three days. The object of grinding the bacilli was the same as Koch's, namely, to crush as much as possible the membrane of the micro-organism and thus facilitate extraction. We must, however, remark that, even after prolonged grinding, we never succeeded in total disintegration of the bacilli, and we could always find in the test specimens numbers of tubercle bacilli taking their usual stain. The very fine powder obtained after grinding was extracted with eight per cent. of AmCl solution for about two days. To avoid contamination as much as possible, the flask was always kept with chloroform. The extraction was then repeated several times, and the extracts analyzed.

It proved to contain three different proteid substances of the coagulation points : 50–64° C. ; 72–75° C. ; 94–95° C.

These proteids differ further in their relations to neutral salts.

1. Thus, fifty per cent, of $MgSO_4$ will precipitate only the first one, and eighty-five per cent. of the same salts will complete the precipitation of the first proteid. $MgSO_4$ to saturation precipitates the second proteid, but does not precipitate the third.

2. NaCl to saturation precipitates only the first one, leaving in solution the other two.

3. Am_2SO_4 precipitates all the three.

Their relations to acids seems also to be somewhat differ-

ent, inasmuch as it requires less acid to precipitate the first proteid than the last ; but on addition of diluted hydrochloric acid to 0.2 per cent. all the three proteids are precipitated..

In order to obtain each proteid in purity the following method would be advisable : Saturate the AmCl extract with $MgSO_4$. The precipitate will contain the first and second proteid, the filtrate the third (Solution A). Wash the precipitate with fifty per cent. of $MgSO_4$; the first proteid will remain insoluble, the second in solution (Solution B). Saturate this solution (Solution B) again with $MgSO_4$ and wash repeatedly with eighty-five per cent. of $MgSO_4$=proteid 2. Saturate the first filtrate with Am_2SO_4=proteid 3. Dialyze out the salts of each of the proteids and they will be obtained in purity.

The largest quantity we had for analysis was twenty drachms of dry material.

The $MgSO_4$ precipitate was too small to separate the first two proteids one from another. The entire $MgSO_4$ precipitate was then purified and tested for phosphorus with positive result.

The third proteid was obtained by means of coagulation, and proved to be much richer in phosphorus than the first two. Another point of difference between them was in the color reactions; the first two gave a positive biuret reaction, while the second gave a negative one.

The residue of the AmCl extract was freed of the greatest part of salt by repeated washing with water and then digested in pepsin—hydrochloric acid ; the residue filtered, washed, and extracted with 0.5 per cent. of AmOH, the extract treated with diluted hydrochloric acid of about 0.1 to 0.2 per cent. A precipitate was formed. This precipitate gave xanthroprotein and biuret reactions. Part of it was treated for determination of bases, but the quantity was not large enough to separate the individual bases.

To sum up our results, we can say that the body substance of tubercle bacilli does not contain any proteids of the albumen nature ; that as the nucleus of cells it consists mostly of

nucleoproteids; that one of the nucleoproteids differs from all the other nucleoproteids inasmuch as it is not precipitated by MgSO₄ (and in this point resembles nucleohiston), and does not give the biuret test; that it contains nucleine or nucleins as such.

Another point worth noticing and further investigating is the coincidence of the coagulation point of the first proteid and of the sterilization point of the tubercle bacilli; both are about 70° C. It would be very interesting to investigate other bacteria in the same direction.

I wish also to remark here that I tested the sample of tubercolo-plasmin prepared by Drs. E. L. Trudeau and E. R. Baldwin, after Buchner's method. The sample proved to contain only the first proteid.

The toxic effect of the different proteids we are not as yet ready to communicate. This part of the work is being studied at present by Dr. R. E. Baldwin.

We hope to be able to continue during the coming winter our studies on the chemical side, so as to be able to work up the quantitative composition of the different substances.

In conclusion I wish to express my sincere gratitude to Dr. E. L. Trudeau, who took great interest in the work. His private scholarship enabled me to carry out this very expensive investigation. Dr. E. R. Baldwin very kindly collaborated in the entire work, and I wish to express my thanks and indebtedness to him.

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Dr. E. K. DUNHAM said that some years ago when tuberculin was first being used in Germany there had been a

Fœtus with Congenital Cystic Kidneys.

death after the tuberculin treatment. On autopsy there
had been observed what appeared to be submiliary tuber-
cules scattered through the lungs and several of the other
viscera, but a search made by Professor Orth and various as-
sistants, including himself, had failed utterly to show any
evidence of the presence of tubercle bacilli. The observa-
tion seemed to be very interesting because there were al-
ready present, as far as the morphology was concerned, the
beginnings of tuberculous formation, an apparent prolifera-
tion due to toxic substances. The process had not gone far
enough to cause degeneration.

Stated Meeting, December 14, 1898.

T. MITCHELL PRUDDEN, M.D., PRESIDENT.

A CASE OF CONGENTIAL CYSTIC KIDNEYS.

Dr. R. G. FREEMAN presented specimens from a case of
this kind occurring in the practice of Dr. H. S. Houghton.
The child lived but a moment after birth. The kidneys were
so large and cystic that the diaphragm was pressed up to with-
in half an inch of the axilla (Fig. 1). The ureters and urethra
were pervious. The fœtus was $16\frac{1}{2}$ inches long, and weighed
$5\frac{1}{2}$ pounds. The left kidney was 6 inches long and weighed
11 ounces. The kidneys were full of small cavities, varying in
size from that of a pinhead to a pea (Fig. 2). On microscopic
examination no tubules were found. In the periphery just
beneath the capsule there were a few malpighian corpuscles,
but none elsewhere. The condition seemed to be the result
of an imperfect formation of the tubules of the kidney. In ad-
dition to this abnormality there were others, *e.g.*, an enceph-
alocele, also six toes on each foot and six fingers on each
hand, with a rudimentary seventh finger on one of the hands.
This condition is not extremely rare. Virchow (*Krankhaften
Geschwulste*, Bd. i., p. 270) mentions having seen many cases.
Such kidneys may be so large as to hinder childbirth.

CYSTIC KIDNEYS IN AN ADULT.

Dr. E. HODENPYL, in connection with this case, also presented a specimen of cystic kidney, removed from a man fifty years of age, who died in hospital from lobar pneumonia. He was moribund at the time of his admission. The urine was not examined, and the bladder was found empty after death. Both kidneys were involved, and each measured about eight inches in its long diameter by three and one-half inches in width and four inches in thickness. They were composed of a mass of cysts, varying in size from that of a pea to an egg. Some of them contained clear albuminous fluid, but the greater number contained blood-stained fluid. Several of the cysts also contained concretions. The parenchyma of the right kidney was almost entirely destroyed; in the left a very small area of kidney tissue still remained.

A CASE OF HYDRENCEPHALOCELE.

Dr. FREEMAN presented a case of this kind occurring in the New York Foundling Asylum. The sac differed from that in the preceding case, in that it was filled with a bloody fluid, which was surrounded by a thin layer of brain tissue. Such malformations were not very rare.

A METHOD OF DETERMINING WHETHER MILK HAS BEEN HEATED TO 78° C. OR HIGHER.

Dr. FREEMAN demonstrated this method. He said that originally Babcock had found that raw milk would break up peroxide of hydrogen into water and oxygen, and Storch found that when milk was heated above 78° C. this property was lost.[1] Several tests for distinguishing raw milk from boiled milk were reported in the *Journal Pharm. et Chem.*, and reviewed in the *Analyst* for August, 1897, and other tests were reported by Henry Leffmann in the *Analyst* for April, 1898. The determination of this question as to

[1] *Zeischrift f. Fleisch- u. Milch-Hygien*, October, 1898, p. 13.

Section through the Left Kidney.

whether or not milk had been subjected to heat was an important one to those working upon the bacteriology of milk. With the development of bacteriology and the determination of the number of bacteria in milk as an index of its cleanliness, the need of some test for determining whether milk had been heated before being submitted to the bacteriologist became evident. A milkman might produce a milk containing a very large number of bacteria, but obtain a favorable report from a bacteriologist by first destroying a part of them by heat. The same result might, of course, be obtained by chemicals. Milk preservatives were very commonly used, but most of them could be detected by well-known tests. Formalin was largely employed for this purpose, but the chemical test for its detection was fortunately extremely delicate. The test about to be described, however, did not show whether or not the milk had been pasteurized, because the temperature of pasteurization was below 70° C. (158° F.). The reagents used by Storch in making this test are : (1) a one per cent. solution of peroxide of hydrogen, containing one cubic centimetre of sulphuric acid to the litre; (2) a two per cent. solution of paraphenylene diamine (Merck) in hot distilled water, which is filtered. One drop of the first solution was added to about one drachm of the milk in a test tube, and then two drops of the second reagent were introduced. On adding this second reagent to raw milk, a dark indigo-blue color was produced. Milk which had been heated to 75° C. gave nearly the same color, but if it had been subjected to 78° C., or a higher temperature, the color was pink, but became somewhat bluish after standing. The specimens of milk used for the demonstration of the test had been heated only for a moment. In a number of experiments which had been made with different samples of milk, the test had seemed reliable.

CANCER OF THE LIVER.

Dr. WILLIAM HENRY PORTER exhibited specimens from

two cases of cancer of the liver. *The first* was a primary carcinoma of the right lobe of the liver. On coming under observation the liver extended considerably below the umbilicus, and there seemed to be a large nodular projection. The fact that the history extended over a period of three years and more had made him suspicious at first that the growth was not carcinomatous; but about six weeks before death a nodule in the left lobe of the liver became soft and fluctuating. On aspiration, cells were withdrawn which resembled those ordinarily found in the scrapings of a carcinoma. This fluid also contained bile pigment and fatty matter. No evidence of a primary growth outside of the liver could be found. The neoplasm seemed to have started in the centre of the liver in the acini, and the growth seemed to take the outline of the liver acini. He had never seen anything like this before. There had been no jaundice whatever. The right lobe of the liver was almost completely obliterated by the new growth.

The second case was one of primary carcinoma of the gall duct, with multiple deposits through the liver. It was interesting simply because it occurred in a man who was only thirty-one years of age. The patient had a syphilitic history. When first seen, the liver extended three inches below the free border of the ribs. In view of the jaundice and the history of syphilis, he was put upon antisyphilitic treatment, and under this the liver was reduced in size, so that it did not project below the free border of the ribs. In the epigastrium there was marked tumefaction, but nodulation could not be detected. The gall duct was found to be completely occluded by a hard growth, which was apparently connected with the gall duct itself.

TUMOR OF UNCERTAIN NATURE.

Dr. ELIZABETH MERCELIS presented for diagnosis gross and microscopic specimens of a tumor which had been removed two months ago from a patient at the New York Infirmary for Women and Children. Her family history

was negative, and she had enjoyed perfect health up to a short time before admission. Three or four months before coming under observation, the woman had noticed a small tumor in the breast. This was found to be freely movable and firm, and the skin overlying it was perfectly normal. The diagnosis of an adeno-fibroma was made, and the mass was removed. On examination, the growth presented masses which could be enucleated and which were considered to be lymph nodes; however, microscopical examination showed no lymph-node tissue, but sharply circumscribed masses of cells resembling epithelial cells. Throughout were numerous spaces, bounded usually by low columnar or cuboidal epithelium, and giving an appearance of alveoli. These spaces upon close examination were found to be either blood-vessels or lymphatics. No characteristic arrangement of cells about the blood-vessels was found, but in a few places the appearance suggested an endothelial origin for the growth. There was only a small amount of reticulum, and this chiefly at the edge of the tumor. In view of these appearances, no positive diagnosis had been made.

TUMOR OF THE BRAIN.

Dr. LEON T. LE WALD presented a tumor of the brain, which had been taken from a male, thirty-six years of age, an Italian laborer. He had complained for a number of weeks of persistent and intense headache, localized chiefly in the frontal region. There had also been attacks of vomiting, without nausea or loss of appetite. On admission to the hospital he was fairly well nourished; his gait was staggering, and he was dull mentally. A diagnosis of cerebral tumor was made. There was no history of syphilis; nevertheless, he was placed on large and increasing doses of potassium iodide, but without improvement. After a time he became comatose and died. The autopsy revealed a marked increase in the intracerebral pressure, and a marked flattening of the convolutions. A tumor was found in the

right frontal lobe, involving practically the whole of that lobe. It was not circumscribed. The centre was hard, but on the periphery were some softened areas. The tumor pressed backward upon and involved part of the corpus striatum, but apparently did not involve the internal capsule, and consequently there were no definite motor symptoms. The diagnosis was made chiefly upon the persistent headache, the vomiting, and the mental symptoms.

Dr. E. K. DUNHAM said that microscopical examination of sections of this tumor showed large cells, resembling ganglion cells, together with neuroglia cells. The large cells he believed to have been derived from the neurolgia. They were very polymorphic, and presented numerous filamentous processes, which soon branched and became lost.

A specimen of the tumor was exhibited under the microscope.

RUPTURE OF THE HEALTHY HEART BY DIRECT VIOLENCE.

Dr. RICHARD C. NEWTON, of Montclair, on invitation, presented the following report of a peculiar case of rupture of the heart:

F. M——, twenty-eight years of age, a carpenter by occupation, was a wheelman of some experience, and was reported to have ridden in some races. On September 19, 1898, at about ten minutes after five, he was riding his bicycle rapidly, when the front wheel came in collision with a stout rubber and canvas hose, four inches in diameter, which was lying on the ground across the road and was distended with water, which it was conveying, under pressure, from a hydrant to a water-cart. There were only two or three eye-witnesses to the occurrence, and their accounts of it differed somewhat. There seemed to be no doubt, however, that the " head " of the wheel was broken near its junction to the fork, by the force of the collision, and that the rider was thrown a foot or two in the air and then fell heavily near his broken wheel. It is probable that he kept hold of the handle-bar and took it with him when he left the saddle. As he struck the hard macad-

amized road the handle-bar was turned over, and its post, a straight steel rod six or eight inches long and an inch in diameter, was interposed between his body and the ground, and consequently struck him with great force in his chest. He got up, holding his hands to his left side, and staggered a few feet, and then lay or fell down in the road, where he re- mained nearly unconscious, groaning and writhing with pain.

He was quickly carried to the sidewalk and a doctor sum- moned. Dr. Wilson, of Bloomfield, saw the man a few minutes after the injury, and found him collapsed, cold, and sweating. He was nearly pulseless, and was lying curled up and in great pain. He was partly conscious, but gave no clear account of himself. A hypodermic injection of brandy was given him, which seemed to revive him somewhat. His pulse improved and he expressed himself as feeling better. No marks or bruises were detected on the body or the head, although they were looked for as carefully as the circum- stances would allow. In the meantime, a wagon having been brought, the man was removed as carefully as possible to the Mountainside Hospital. Before he arrived there he revived enough to tell his name and residence. On admis- sion he was still in great pain and had a tendency to throw himself over on his left side. He did not vomit or raise any blood, nor did the bowels or kidneys act. After he had been carried into the hospital the speaker, who was at this time the surgeon on duty, was summoned. The man's pulse was 78 and moderately strong. He called for water, but was only able to swallow a very little. There were no convulsions. The man quietly died at 6:45 P.M., before the speaker arrived at the hospital, and a little more than an hour and a half after the fall. Dr. Washington, the county physician, was notified, and about eleven o'clock the next morning he viewed the body and directed a partial autopsy, the heart only to be examined if, as seemed probable, the cause of death should be found in this organ. The autopsy was per- formed seventeen hours after death. The body was that of a well-developed, muscular young man, about five feet six

inches tall, and weighing about one hundred and forty-five pounds. Rigor mortis was marked. Two or three unimportant bruises were noted on the shins and about the knees. A small, semicircular, freshly made, depressed mark was seen on the skin over the sixth rib, about half way between the nipple line and the sternum on the left side. This had apparently been inflicted by a piece of tubing, or other hollow cylindrical body, about an inch in diameter. A small depression, about an inch internal to this mark, was noted, as though one of the costal cartilages had been fractured and depressed, and pressure at this spot showed that this lesion had occurred. When the chest wall was opened, nothing abnormal was detected, except the fracture of the sixth costal cartilage, near its junction to the sternum, and some laceration of the intercostal muscles. The pericardium was intact, but somewhat distended. When it was opened it was found to contain from eight to ten ounces of dark clotted blood. When the heart was lifted up its cavities were partly distended with blood. Its weight was eleven and one-quarter ounces after all the blood had been washed out of it. A transverse rent was discovered at the apex of the right ventricle, extending through its wall. The tear had nearly separated a triangular flap of the heart substance. The measurements were as follows: From apex of heart to upper extremity of posterior tear, one and one-fourth inches; from apex to upper extremity of anterior tear, one and five-eighths inches. At each of these extremities the epicardium was torn several lines farther than the muscular tissue. This tear of the epicardium was more extensive on the anterior aspect. On turning up the flap, the rent measured from side to side, externally, one and one-half inches; and internally, through the endocardium, three-eighths of an inch. The internal rent was immediately contiguous to the intraventricular septum. In other respects the heart walls and valves were normal and competent. By permission of Dr. Washington, the heart was removed and placed in two per cent. formalin solution. The speaker said that there seemed to be no reasonable

doubt that, after the collision and the breaking of the bicycle, the rider was thrown from his wheel with great violence and struck against the end of a piece of tubing, which fractured the sixth costal cartilage without penetrating the skin, and and drove the outer fragment (still attached to its rib) into the apex of the heart, during systole, with the result that the wound just described was inflicted. Dr. Newton said that Gamgee, in 1871, had reported twenty-nine cases of rupture of the heart, and he had himself collected about fourteen additional ones since that time, but in very few of these cases was the heart found to be healthy. Some of them had been ruptured by a comparatively slight injury.

RENAL ADENOMA.

Dr. E. K. DUNHAM presented three sections from what was supposed to be a renal adenoma. He had been puzzled to determine from what the growth had been derived. The relations of portions of the adenoma to the substance of the kidney itself were so close that it was difficult to believe that the tumor arose from the adrenal. There were certain appearances (mitotic figures) which seemed to indicate that the epithelium covering the glomeruli of the malpighian bodies was proliferating. The character of the cells in the tumor was much like the epithelium of the renal tubules.

DEMONSTRATION OF SOME NOTEWORTHY FORMS AND COMBINATIONS OF MALARIAL PARASITES OBSERVED AT CAMP WIKOFF.

Dr. JAMES EWING presented four slides from cases of malaria studied at Camp Wikoff. On *the first slide* was to be seen a mixed infection—the æstivo-autumnal and tertian malarial parasites. In one field were two specimens of tertian ring-shaped organisms and three of the æstivo-autumnal ring-shaped organisms. These specimens were interesting as illustrating the differences in the morphology of these two ring-shaped parasites. The tertian rings are coarser than the æstivo-autumnal, although they may be of

about the same size. The tertian rings showed a quite distinct and large achromatic spot, two or three times the thickness of the ring. It was probably the nucleus, as it stained with hæmatoxylin. The æstivo-autumnal ring did not exhibit any demonstrable achromatic spot of the size of the other. Both the tertian rings showed one or two very fine pigment grains, whereas the early æstivo-autumnal rings were entirely without pigment—as was usual in the cases of Cuban malaria examined. These three points were the distinguishing ones so far as his experience had gone. In the same field of the microscope was a young crescent, thus placing beyond doubt the question of a mixed infection.

The second slide furnished an illustration of "twinning" of the tertian parasite—a process not at all uncommon in tertian malaria, but much more common in the æstivo-autumnal form. In this particular instance the blood was taken about two hours before the expected chill, from a man suffering from quotidian paroxysms, and the specimen showed a segmenting body and a half-grown parasite in the same red cell.

The third slide showed another form of twinning of the tertian parasite, which he had seen only in the Cuban cases. In this specimen there were a great many cells containing parasites in which, evidently, the amœboid motion had been very active, and the parasites, instead of being in a more or less spheroidal form, were strung out into a number of fine threads with nodal thickenings. In each cell presenting this peculiar appearance there were two achromatic nuclear spots, indicating the presence of two parasites. He had never met with a description of this particular appearance, and could not state what was its significance.

On *the fourth slide* was to be seen a very richly pigmented leucocyte of enormous size—one of very many seen in a fatal case of æstivo-autumnal and tertian infection. The importance of these leucocytes was very great in diagnosis, and their appearance, when typical, seemed to him to be quite as characteristic as that of the parasite itself.

Dr. Ewing asked if any of the members of the Society had had experience with a new stain for the demonstration of the nucleus of the malarial parasite, recently described in a monograph by Ziemann. This observer used various proportions of a one per cent. watery solution of rectified methylene blue, and a one per cent. watery solution of eosin, and demonstrated throughout the body of the parasite certain reddish stained areas. Dr. Ewing said that he had been able by means of Ziemann's stain to demonstrate these areas, but they did not correspond to the nuclear spots which can be stained by hæmatoxylin, and it seemed to him very doubtful whether they represented the nucleus or some other portion of the parasite or of the disorganized red cell.

A CASE OF PYROGALLIC-ACID POISONING.

Dr. GEORGE P. BIGGS presented specimens from a case of pyrogallic-acid poisoning. The subject was a Chinaman, thirty-seven years of age, who was interested in photography. He was taken sick with symptoms quite typical of appendicitis, and was admitted to the hospital on this diagnosis. On account of marked abdominal distention, vomiting, cyanosis, and partial collapse, it was thought that perforation had occurred, and cœliotomy was promptly performed, the sloughing but not perforated appendix being removed. It was necessary to give oxygen with the anæsthetic. Cyanosis continued after the operation, and the urine was found to be almost black in color. It was then learned that he had, before admission to the hospital, taken internally a solution of pyrogallic acid which he had for photographic purposes, thinking it would relieve his fever. The symptoms steadily grew worse until death, about forty-eight hours after taking the poison. At autopsy the blood was found practically all converted into black clots; the lungs were very much congested ; the spleen was large, very soft, and of black color ; the kidneys were intensely congested and of a dark red color ; the urine was scanty, almost black,

rich in albumen, and contained many blood-casts. A micro-scopical examination of the fresh tissues showed marked fatty degeneration of the liver, but not of the heart or kidneys.

THE EFFECT OF CAUTERIZATION OR CLEANSING OF WOUNDS INFECTED WITH RABIES AFTER AN INTERVAL OF TWENTY-FOUR HOURS.

Dr. F. CABOT read a paper on this subject, in which he described a series of experiments that had been undertaken at the laboratory of the New York City Health Department, with the object (1) of demonstrating, if possible, that even twenty-four hours after infection the development of rabies may be prevented ; and (2) of demonstrating the compara-tive value of some cauteries and simple cleansing of the wound. In these experiments he had used 287 guinea-pigs. The first 79 were employed to demonstrate at what point, where the cautery could be used, inoculations were most fatal. A portion of medulla was taken from a rabbit dead of laboratory rabies, and was beaten into an emulsion with sterile water. One cubic centimetre of this was injected into the upper and outer part of the thigh of a guinea-pig. The animal was then left undisturbed for twenty-four hours, when an incision, half an inch long, was made over the site of the puncture, exposing the nerve and surrounding tissue. The wound was then swabbed out and the cautery applied. The first cautery used was chemically pure nitric acid. Sixty animals were experimented with, and of the thirty-four animals that were cauterized in this manner ninety-one per cent. lived. In another series of experiments fifty-nine ani-mals were used, and forty-four were treated with the actual cautery. Of this number seventy per cent. lived, or twenty-one per cent. less than when nitric acid was used. The reason probably was that it was more difficult to reach all parts of the wound with the actual cautery than with nitric acid. In a third series of experiments, thirty-seven out of forty-five animals were cauterized with a stick of nitrate of sil-

ver. Of these, fifty-five per cent. lived, showing nitrate of silver to be inferior to the other two caustics. In a fourth series on forty-nine animals, at the end of twenty-four hours after infection, the point of infection was cut open, and in twenty-six the wound was swabbed out with dry absorbent cotton and then left open. Of these twenty-six, thirty-one per cent. lived. All the animals dying in these experiments had typical rabies. The author's conclusions were: (1) In ninety-one per cent. of the guinea-pigs rabies can be prevented from developing if the wound be cauterized with strong nitric acid within twenty-four hours after infection; (2) strong nitric acid is more effectual than the actual cautery or nitrate of silver; (3) some degree of benefit is derived from thoroughly opening and swabbing out an infected wound within twenty-four hours after the infection; (4) in cases where the Pasteur treatment cannot be obtained, great benefit may be derived from the correct use of the cautery and proper treatment of the wound, and even where the Pasteur treatment is resorted to early cauterization is of great assistance; (5) in small wounds probably the only treatment indicated would be thorough cauterization; (6) that a small percentage, eleven to fifteen, of guinea-pigs have a natural immunity to hydrophobia, as demonstrated in the cases of the controls used in each series of experiments when no after-treatment was employed.

Dr. ROBERT J. WILSON said that the percentages obtained with the cautery or with nitric acid were somewhat larger than he had personally been able to secure with the Pasteur treatment, but Dr. Cabot had introduced the virus under the skin, whereas the speaker had introduced it under the dura mater, making the infection certain. He was of the opinion that if dog-bites were cauterized thoroughly and early, there could hardly be any better preventive. Out of all the cases seen at the Health Department there had only been one which had been thoroughly cauterized.

Dr. W. H. PARK said that about ten days ago three persons, each of whom had been bitten by a different dog, had

applied for treatment, and in at least two of the three there was considerable doubt as to whether the dog was rabid. The bites from these dogs were all very slight. None of the bites had been cauterized, and the persons had not sought treatment until three days afterward. If these persons had been cauterized there would have been no need to go on with the Pasteur treatment for the ten days which necessarily elapse before it can be decided whether or not the dogs are rabid. He believed that to Dr. Cabot was due the credit of having suggested the use of guniea-pigs instead of rabbits for inoculation experiments, to determine whether or not a given case is one of rabies. Rabbits take fifteen or sixteen days before coming down, while guinea-pigs only take about ten days. Hence, by using guinea-pigs there is a saving in time of about one week. Guinea-pigs also possess the advantage of being less susceptible to septic infection than rabbits, so that when somewhat decomposed brains were received from dogs, it was often found that the guinea-pigs survived until the rabies developed, while the rabbits died of acute septicæmia.

REMARKS UPON A UNIFORM METHOD OF TESTING ANTITOXIN.

Dr. W. H. PARK read a paper with this title. The method developed in the laboratories of the New York City Health Department, by Mr. Atkinson and himself, consisted in a more careful selection and definition of the toxin to be employed than was required in the old Behring-Ehrlich method. Ehrlich himself first pointed out that toxins developed from different cultures, or even from the same cultures, had at times very different neutralizing values. An antitoxin tested by the old Behring-Ehrlich formula might, according to the toxin used, vary fully two hundred per cent. in the values given by the old test. Their investigations revealed the fact that the varying neutralizing power of the toxin followed a general law. Early in toxin production, as pointed out in the speaker's article in the

September number of the *Journal of Experimental Medicine*, a great many more fatal doses of toxin were neutralized by one unit of antitoxin than in older cultures; thus six hours after the beginning of toxin formation in a culture, one unit of antitoxin neutralized about one hundred and twenty fatal doses of toxin; five days later the toxin from the same culture would have but ninety fatal doses neutralized, and six weeks later but thirty fatal doses. Since then he had tested the neutralizing value of toxins developed by the same culture in differently prepared culture fluids, and had found that at the same period of toxin formation the toxins in these different media had the same neutralizing value for antitoxin. After having once tested at different periods the toxin of a culture with persistent characteristics, it was possible, therefore, at any time to obtain a new toxin which would have the same testing value as the previously used standard. They found, for instance, that one antitoxin unit always neutralized in the guinea-pig between eighty-five and ninety fatal doses of any toxin developed by the culture which we call No. 8, if the toxic fluid was removed from the culture upon either the fifth or sixth day of toxin formation. If this culture, which was already in the possession of over fifty laboratories, or some other, should be used by all antitoxin laboratories, a uniform standard toxin would be always on hand, and not only the same laboratory but all laboratories would have at hand the power to retain a permanent standard, and would not need to depend on comparisons with a standardized antitoxin which might have become changed in transportation.

Dr. T. MITCHELL PRUDDEN said that the teaching of many surgeons was that it did not make very much difference whether dog-bites were cauterized or not, especially after the lapse of a few hours; hence the great practical importance of this research. The use of the guinea-pig, in establishing a diagnosis, was also important, as a gain of five or six days was of very great advantage, especially to

persons who must go long distances for the Pasteur treatment. It was well to record the fact that in certain parts of New Mexico and Arizona hydrophobia in the "domestic" skunk and in a variety of small wild, spotted skunk was becoming a very serious matter, because the cattle and ranchmen and campers-out during the hot months were constantly exposed to this danger if they slept on the ground, as had been their custom. It was formerly the belief that these small spotted skunks were always in a condition to convey rabies, but this notion was waning, and it was now believed that only those skunks which had been bitten by other rabid animals were virulent. The matter had become so important in the Southwest that it was proposed to bring it to the attention of the territorial legislature for investigation.

Stated Meeting, January 11, 1899.

T. MITCHELL PRUDDEN, M.D., PRESIDENT.

RUPTURE OF THE URINARY BLADDER FROM OVER-DISTENTION.

Dr. E. HODENPYL reported this case, and presented the specimen, which had been removed from a man of fifty years, who, five days before death, had become extremely intoxicated and had remained unconscious for a number of hours after reaching the hospital. On admission there were a a bruise over the left eye and some epistaxis, but no other marks of violence. A catheter withdrew about fifty ounces of bloody urine at first, and each time after this some bloody urine was withdrawn. During the five days he was in the hospital he was not able to empty his bladder. The case was supposed to be one of rupture of the kidney. The autopsy revealed a marked pulmonary œdema, which had been apparently the immediate cause of death. In addition,

there was found a ruptured bladder.   There was no peritoni-
tis or effusion of blood into the abdominal cavity, but about
six ounces of urine was found in the pelvic cavity.   On re-
moval of the bladder, a large L-shaped rent was discovered
in the fundus, the long diameter of the opening correspond-
ing to the anterior surface of the viscus.   The edges of the
rent were completely healed.   The mucous membrane of the
bladder appeared to be normal.

SYPHILITIC PNEUMONIA WITH LESIONS OF THE KIDNEY.

Dr. Hodenpyl also exhibited a series of fresh specimens
removed at autopsy a few hours earlier.   The subject, a
woman, aged thirty-five years, had entered the hospital the
previous night, suffering a good deal from dyspnœa.   Her
urine was of low specific gravity and contained albumen and
casts.   The right lung was moderately emphysematous and
quite anæmic.   The left lung was firmly adherent to the
chest-wall and considerably compressed, and the pleura was
greatly thickened over it.   On section, there were found
numerous small cavities (bronchiectasiæ) and dense fibrous
tissue between them without any evidence of tubercle.   The
condition of the lung was considered to be the result of
syphilis.   At the middle portion of the lesser curvature of
the stomach were three ulcers, the larger measuring two
inches in its largest diameter.   It had perforated at some
previous time, as shown by the presence of adhesions.   The
floor of this ulcer was made up in part of connective tissue
and in part of the pancreas.   The capsules of both kidneys
were adherent.   In one kidney there were several stellate
cicatrices, and in this organ the cortex was thickened and
pale, and the vessels were dilated and thickened.

Dr. JOHN H. LARKIN asked if thrombosis did not have
something to do with the color of the large white kidney just
presented.

Dr. HODENPYL replied that, as the blood-vessels were
found plugged with thrombi, it was evident that this account-
ed largely for the color of the organ.

SMALL ACCESSORY SPLEEN IN THE BODY OF THE PAN-
CREAS IN AN INFANT.

Dr. ROWLAND G. FREEMAN reported this case and
presented the specimen.   At the autopsy the pancreas
exhibited a small, dark spot, about one-fourth of an inch in
diameter, the nature of which was not suspected at the time.
However, on microscopic examination it proved to be an
accessory spleen, as it was entirely surrounded by pancreatic
tissue.   This condition was rare.   Dr. George P. Biggs had
presented to the society two cases of accessory spleen in the
pancreas, in 1893, and in one of these the spleen was entire-
ly surrounded by pancreatic tissue.

AMŒBIC DYSENTERY SIMULATING TYPHOID FEVER.

Dr. GEORGE A. TUTTLE presented the organs from a man
who had been a resident of the tropics for three or four
years.   He had been in good health up to one year ago,
when he had had a sudden attack of pain just below the
border of the ribs on the right side and radiating down into
the abdomen.   From that time until his admission in the
hospital there had been about fifteen attacks of severe pain.
In the last one the pain extended through the back and
underneath the scapula.   Four or five of these paroxysms of
pain were attended by jaundice.   A few days before his
admission, November 15th, there had been severe pain
associated with a temperature of 103° or 104° F.   Sub-
sequently the temperature ranged from 101.5° in the morn-
ing to 103° or 103.5 F. in the evening, for a period of a week
or ten days at a time, and then it fell nearly to the normal,
remained there for a day or two, and again rose.   There was
at this time no jaundice and no lesion of the heart.   No cal-
culi were discovered in the stools.   After some days a rounded
swelling was noticed under the border of the ribs on the
right side, which was thought to be the gall bladder.   On
November 29th he was operated upon for gallstones, but
none found.   The gall bladder was distended with about

three ounces of thick bile; its walls were thickened and somewhat inflamed. Palpation of the liver revealed no abnormality. The temperature remained elevated, and about five or six days later there was evidence of fluid in the pleural cavity. On December 11th, paracentesis of the chest was performed, the ribs were resected, and a considerable quantity of pus evacuated. Exploration beneath the diaphragm failed to show the presence of pus. At the time of the first operation some cultures were taken from the gall bladder, and about half a dozen minute colonies were developed. They were actively motile, and responded to all the tests for typhoid bacilli. They produced no indol, no coagulation of milk, and no fermentation. With a specimen of typhoid blood they gave the characteristic Widal reaction. At the second operation cultures were also taken, and these gave two varieties of bacilli—one exactly like the first, and the other the colon bacillus. The fever persisted, and the man gradually became weaker, and died on January 3d. He gave no history of dysentery or typhoid fever, and exhibited no symptoms of dysentery while under observation. At the autopsy the heart was found to be normal. The left lung was practically normal. The right lung was adherent everywhere except over a small area around the opening through the chest-wall. The lower lobe was excavated by a sloughing cavity which reached as far up as the upper lobe. The diaphragm was apparently absent beneath this cavity, and the base of the cavity was formed by a large cup-shaped depression on the right lobe of the liver. This opened into another smaller cavity, deeper in the substance of the liver. In addition, a number of smaller abscess cavities were discovered in the right and left lobes of the liver. The kidneys were normal. The small intestine gave no positive evidence of typhoid fever, although a few of Peyer's patches had an appearance suggestive of the possibility of their having been the seat of cicatrization. In the caput coli, and for a distance of six or eight inches along the ascending colon, the wall was riddled with small, grayish ulcers, and an

occasional ulcer was seen throughout the remainder of the
colon.   This suggested the presence of the amœba, but it was
only a few hours before that examination proved the presence
of the amœba coli in this case.   Whether the bacilli referred
to were really typhoid bacilli remained yet to be proved.

Dr. W. H. PARK said that at the Health Department
laboratory they had experimented with a large number of
bacilli and had found only one that gave a reaction which
was not the genuine typhoid bacillus.   Curiously enough
this, except in its size and motility, bore no resemblance to
the typhoid bacillus.   This bacillus came from the fæces of
one of the persons in the laboratory.   He recalled a case
seen in the Roosevelt Hospital in which a good Widal re-
action had been obtained, yet an exploratory operation
showed an advanced stage of carcinoma.   After the explor-
ation, the intermittent fever gradually subsided, and the
Widal reaction nearly disappeared.   This was probably an
irregular typhoid infection.

Dr. TUTTLE said that the curious feature of his case was the
fact that during the seven weeks the man was in the hospi-
tal his bowels had never moved without enemata or laxatives.
At no time had there been any blood in the stools or any-
thing to call attention to the condition found at the autopsy.
The Hiss test had been tried, and seemed to respond fairly
well.

TUMORS OF THE ŒSOPHAGUS.

Dr. JOHN H. LARKIN presented three tumors of the
œsophagus.   *The fiest case* was that of a man forty-five
years of age, who had been an inmate of the hospital for con-
sumptives for seven months.   He gave the ordinary physical
signs of an acute pulmonary tuberculosis, and tubercle bacilli
were found in his sputa.   It was not until four weeks before
death that he complained of dysphagia.   As he was subse-
quently obliged to subsist on fluid diet, the emaciation be-
came extreme.   He was forty-eight hours in coma before
death.   The autopsy revealed cavity formations in both

lungs, a diffused tuberculous pneumonia, a general tuber-
culous peritonitis, and tuberculous kidneys. The mediastinal
lymph nodes around the root of the lung and along the
spine were very large and hyperplastic, and on section
looked cheesy. At the periphery of these cheesy nodes
were small, hard, white areas about the size of a pin-head.
In the œsophagus was an ulcerated mass about four inches
in length, involving all of the coats of the œsophagus.
Below the lowest portion of this ulcerated mass were fine
white nodules, and below these small, punched-out ulcers ex-
tending down to the cardiac end of the stomach, and re-
sembling miliary tubercles. There were a number of these
white areas in this portion of the stomach. Judging from
the diffused tuberculosis present, the tumefaction and ulcer-
ation in the œsophagus were at first thought to be tuber-
culous, but further examination revealed an epithelioma of
the œsophagus. The enlarged lymph nodes in the media-
stinum were tuberculous, but the little white areas at the
periphery were epitheliomata.

The second case was one of epithelioma of the œsophagus,
occurring in a man fifty-four years of age, who gave a history
of dysphagia for five months before entering the hospital.
At the time of admission he was very greatly emaciated and
could take only fluid food, and that in very small quantities.
Operative interference was not deemed advisable. He re-
mained in this condition for two months, being sustained by
rectal alimentation solely. He died seven months after the
first symptoms. At the autopsy the lungs were found to be
normal; the heart was slightly fatty; there was general
venous congestion of the viscera, especially the liver, and
several metastatic nodules were seen in this organ. The
stomach was unusually small, measuring sixteen centimetres
from the cardiac end to the pyloris and four centimetres at
its widest part longitudinally. It exhibited an hour-glass
contraction. The tumor in the œsophagus was situated
about three inches above the cardia, and in the centre of the
ulcerated mass was a little furrow.

The third case was also one of epithelioma of the œsoph-
agus. The subject was a man fifty-one years of age, who
gave a history extending back only six weeks. He had
complained of disphagia for only one week. He was not
emaciated, but his breathing was exceedingly loud and strid-
ulous. There was no involvement of the vocal cords.
About eight hours after coming to the hospital tracheotomy
was done, but he died the following morning. The autopsy
was made about three hours afterward. At the upper por-
tion of the œsophagus, behind the larynx, the arytenoids
and aryteno-epiglottic fold, and extending downward about
two inches, was a flattened mass exhibiting a slight super-
ficial ulceration. There was a very well-marked œdema of
the larynx. The most common place for epithelioma of the
œsophagus was said to be below the cricoid cartilage, and
very few cases had been found in which the tumefaction had
been high up, except when they were secondary to epitheli-
oma of the tonsils or larynx.

Dr. JAMES EWING said that in the first case reported by
Dr. Larkin there had been an almost continuous discharge
of a thin milky fluid from the ulcerating surface. He had
examined this fluid, which he believed came from the sur-
face of the œsophageal tumor, yet had found in it no evi-
dence whatever of a new growth, the fluid consisting princi-
pally of leucocytes, necrotic granular matter, and bacteria.

INFLUENZA BACILLUS.

Dr. W. H. PARK said that bacteriological examination of
a case supposed to be one of pneumococcus infection had
revealed the fact that about ninety-five per cent. of the
micro-organisms in the smears were influenza bacilli. This
was interesting when contrasted with two other cases giving
symptoms of influenza, in one of which streptococci had
been found and in the other pneumococci, but no influenza
bacilli. The latter were easily obtained from the infected
lungs by streaking an agar plate first with blood from the
rabbit and then with the exudate. From the sputa it was

more difficult, and at least half a dozen plates should be made. The colonies were about half the size of those of the pneumococcus and were exceedingly faint. These bacilli grew in hæmoglobin or blood and occasionally made threads. They grew only at fairly high temperatures, and did not produce septicæmia in animals. They were not stained by Gram. As a rule, these bacilli did not grow at all secondarily without blood, and never to any extent.

Dr. EWING asked Dr. Park if he had had any experience in the examination of the sputum of cases of influenza, and if he had found, as some had stated, a characteristic grouping of the bacilli within the leucocytes, and whether the bacilli could be identified by these or other morphological characters.

Dr. PARK replied that a fair guess could be made from the large number of small bacilli present rather than from the grouping. He did not believe any observer could absolutely distinguish the influenza bacilli in the sputum alone. These bacilli grew best in pigeon's or rabbit's blood, and very little hæmoglobin was required. Sterilized horse's blood had also given fair results.

A PIN IN THE VERMIFORM APPENDIX.

Dr. HARLOW BROOKS presented specimens taken from a woman who had died of broncho-pneumonia, and who had been supposed to be suffering from influenza. The vermiform appendix was found adherent to the sheath of the psoas muscle and also to a cystic ovary. The appendix itself had ulcerated through, and was bound down by very dense adhesions. There was a small collection of pus and fecal matter surounding the perforation. On cutting into the appendix he had found a pin covered with calcareous deposit and lying in the appendix, head down. The woman was partly irrational when brought to the hospital and gave a very unreliable history, but she had persisted in saying that she had had much pain in the right iliac fossa. The case represented apparently a very slow form of the disease and a most unusual causative factor.

A CLOT ON THE AORTIC VALVE CAUSING MISLEADING
PHYSICAL SIGNS.

Dr. BROOKS also presented specimens from a woman who gave a previous history of cardiac trouble following an attack of gout, several years previously. The apex beat of the heart was in the fifth space; there were a diffused systolic murmur at the apex and a thrill, evident on palpation, in the same area. There was a double systolic murmur at the apex, transmitted to the left, and a double murmur was audible over the aortic valve. The pulsations of the vessels in the neck and in the episternal notch were marked. Three eminent clinicians who saw the case diagnosticated aneurism of the transverse arch. At the autopsy the arch of the aorta was found not dilated at all, but the aortic segments were the seat of an acute ulcerative process. Attached to the flaps was a very dense clot, which extended up in the arch as far over as the subclavian on the other side. It was very intimately adherent to the segment of the valve and had become, near its base, in part calcareous. It was evidently a pre-formed clot. It was probable that the thrill had been caused by this clot vibrating in the stream of blood. The other symptoms were accounted for by the state of the mitral and aortic valves. On looking over the literature, Dr. Brooks said that he had found an account of several cases in which thrombi in the aorta had given rise to thrills and auscultation sounds closely simulating those heard in cases of aneurism.

Dr. D. H. MCALPIN presented, in connection with this case, a heart that had been taken from a patient who had presented a systolic murmur during life, transmitted up the vessels of the neck, a diastolic murmur transmitted downward along the sternum, and a systolic murmur heard at the apex, and transmitted to the left and backward. In this case the diagnosis of mycotic endocarditis was made. Cultures were taken from the blood by three observers, none of whom was able to discover any growth. Twenty-four hours before death the patient developed friction sounds, and a

diagnosis was made of pericarditis. The autopsy revealed a condition very similar to the one just described by Dr. Brooks. There was a somewhat calcified vegetation attached to the aortic valve and extending up into the aorta. Behind the segment of the aortic valve to which this vegetation was attached was a large pouch filled with chocolate-colored material. Cultures from this showed no apparent growth. There was no thrill felt in this case. The question arose as to whether this might not be a post-mortem clot. The anterior portion of the clot was whitish, but it was discolored posteriorly.

Dr. CARLIN PHILLIPS thought it would be interesting to ascertain whether or not these thrombi were organized. It was most probable that the thrombus presented by Dr. Brooks was thoroughly organized; on the other hand, the specimen presented by Dr. McAlpin was apparently one of late formation, while the circulation was enfeebled, and consequently gave rise to no physical sign.

THE INFLUENCE OF HEPATIC, RENAL, AND OTHER CELLS UPON THE TRANSFORMATIONS OF INDOL AND PHENOL.

Dr. C. A. HERTER and Dr. A. J. WAKEMAN presented a paper with this title. Dr. Herter said that indol and phenol had been selected because they were normal products of proteid cleavage in the intestine, and were often formed in excessive quantity in the course of digestive derangements, and also because both indol and phenol were recognizable by means of delicate color reactions. Two methods have been pursued. In the first, the organs of healthy rabbits were removed after the animals had been nearly bled to death. After fine comminution of the organs seven grammes were brought into contact with a weak solution of either indol or phenol for two or three hours. The mixture was then subjected to distillation, and the distillate was tested for the indol or the phenol. All of the organ-pulps possessed some activity, as was shown by comparison with controls. Eighteen observations were made with phenol. The liver distil-

late gave the smallest coloring, hence the activity of the liver was greater in disposing of the phenol than was that of all the other organs studied. The kidney occupied the next place, as shown by a study of twelve cases. The next was muscle, and after this came the blood and then the brain. Millon's reagent was employed in testing for phenol and the so-called " Choleraroth-reaction " for indol. The brain and blood behaved very much alike. Less uniformity was observed in the thirty observations with indol. The liver in eleven led in activity ; in two it was the same as the kidney, in one the same as the brain, and in one it behaved the same as the kidney, muscle, and blood ; nevertheless, it led the other organs, though the kidney was a close second. The order of activity was : liver, kidney, muscle, brain, and blood. There was little difference between the brain and muscle. The results differed from those with phenol in that the blood showed the smallest action of any in the series.

In the second method, the investigation consisted in the use of intravenous infusions of solutions of these substances. They were given until nervous symptoms appeared ; then the animals were quickly killed, and definite weights of the organs were submitted to examination. There was much confusion in the order of the color tints in the series. The muscle exhibited less color than in the others, possibly because less phenol had passed in, or because it had been more rapidly transformed ; but in view of the fact that in the contact experiments there was less activity here, it was probable that the muscle took up less of the phenol than the other organs. The liver and kidney did not differ materially in the injection experiments. In the case of the indol injections, as with those of phenol, the muscle contained less of the infused substance that any other tissue, due either to less absorption or to moderate transforming power. In a very large proportion of cases the liver yielded more color than any other tissue, probably because the liver was especially active in removing indol from the blood. Owing to the experiments being made on rabbits, sufficient spleen-pulp for study could

not be obtained, but it was probable that this organ would take a position similar to that of the liver. The authors concluded from their observations, that the process by which indol and phenol were converted into other substances went on more actively in the liver and kidney than in the other organs and tissues. Indol was converted into indoxyl potassium sulphate, and it was conceivable, though not experimentally proven, that the oxidation step which preceded this formation was exerted in various cells of the body, chiefly the liver. Jacquet found in 1893 that the tissues possessed good oxidizing power, even after immersion in alcohol for some time. Then it was found that dead tissues had a certain oxidative power. Our present knowledge indicated that the oxidative changes carried on by cells removed from the body had reference to substances easily oxidized, and it was justifiable to hold that such changes went on with equal vigor in dead and living cells. Treatment of the cell-pulps with boiling water and strong sulphuric acid, and exposure to a temperature of 160° C. failed to destroy their power to change indol and phenol. This was not, however, absolutely inconsistent with the theory that their activity was the result of a ferment.

Dr. P. A. LEVENE said that, if oxidation took place, it might be ascribed to bacteriological activity and the development of nascent hydrogen, as most of the changes occurred in the first few minutes, this would seem to be excluded.

Dr. HERTER replied that some of the pulps had been purposely allowed to undergo putrefaction, and it had been found that their activity had been lessened thereby. The very great rapidity with which these changes took place, and the fact that the same transformations went on in the body of the animal with rapidity, seemed entirely to exclude the action of bacteria.

Dr. BOOKMAN said, that the experiments described in the paper seemed to him to verify the theory that the changes were due to enzymes. Professor Fisher, in isolating some

of the enzymes, had demonstrated that very similiar changes occurred.

Dr. LEVENE thought that the changes that occurred must depend not only upon the chemical, but upon the physical, condition of the organs. The liver consisted mostly of cells, far more so than muscle. As long as there were relieving cells, poisoning should not give very definite results. It was very doubtful if the activity of the enzymes had anything to do with this matter, as there were very few oxidizing enzymes known. Their action was hydrolytic.

ON THE ESTABLISHMENT AND CONSER-
VATION OF PURITY IN PUBLIC
WATER SUPPLIES

By

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ON THE ESTABLISHMENT AND CONSERVATION OF PURITY IN PUBLIC WATER SUPPLIES. [1]

By WILLIAM T. SEDGWICK, Ph.D.

A public supply is a public danger, and for two reasons: first, because it affects large numbers of people and, second, because it is beyond their supervision and control. Along with the substitution of the convenience of public, for the inconvenience of private, supplies of gas, water, milk, and conveyance, goes inevitably the surrender of the privilege of private supervision and superintendence. This is one of the obvious disadvantages of urban life everywhere and especially of life in great cities. The social unit—the family—can as a rule no longer use its own well, its own cow, its own carriage. It must depend as a rule upon the public water supply, the public gas supply, the public milk supply, the public rail car. These are, of course, often cheaper and more convenient but, unhappily, often also more dangerous. On the other hand, it is easy to see that public supplies may easily be made public safeguards. All that is necessary is to substitute for private supervision and private control such expert and scientific superintendence as the danger involved demands and, so far as public supplies are concerned, a condition of the whole may often be obtained far superior to any within the reach of a single member or family of the community. It cannot, therefore, be too soon or too plainly understood that common sense, as well as science, absolutely

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[1] The " Middleton-Goldsmith " lecture read by the author before the Society, March 15, 1898.

requires from great cities the most expert public supervision
attainable in place of private supervision surrendered.   This
surrender, indeed, is not unconditional.   If public service
cannot or does not secure or provide such adequate and ex-
pert supervision, there will be a return to the more primitive
state.   Intelligent families will prefer country to urban life,
and private to public supervision.   The rapid growth of
suburban populations, sometimes at the expense of the more
urban, may be already, in part at least, due to the lack of
such adequate supervision in great cities.

The most important public supplies of cities are food,
drink, and air.   Of these the water supply is easily of the
first importance to the sanitarian, for the reason that the air
supply is almost wholly beyond his control, while the food
supply, with a few exceptions such as milk, raw oysters, and
certain fruits and vegetables, is purified by cookery before it
is swallowed.   Water, on the other hand, is swallowed raw,
often (relatively speaking) in very large quantities, and it is
now universally admitted that impure drinking water is a
ready vehicle of disease.

It is one of the immense advantages of the zymotoxic
theory of infectious disease that it has made easy of com-
prehension the precise method of conveyance of disease
germs.   At the same time it is no less valuable in other
directions, since it makes it possible, at least for experts, to
understand why some diseases are, and some are not, readily
conveyed by water ; how, precisely, impurity arises ; how it
may be avoided or overcome, and purity established ; and
finally, how purity, having once been established, may be
effectually or ineffectually conserved.   When we consider
the enormous quantities of water required by large cities,
most of which is not used for drinking, but all of which
must be fit to drink, we may readily appreciate the impor-
tance of the subject with which this lecture deals.

The Atmosphere as a Source of Water Supply.—The ulti-
mate source of all water supply, public or private, is the
atmosphere, in which the vapor of water (derived from land

or sea) is condensed and precipitated as rain, snow, dew or fog. Theoretically, every rain-drop must form about some material particle, and the only particles of this kind in the atmosphere are particles of dust. Dust particles are frequently largely composed of the bodies of micro-organisms, and hence it follows that at the very instant of its birth the rain-drop may enclose one or many micro-organisms. On the other hand, such bacterial bodies may not be alive but dead ; and dust consists of many other things than micro-organisms, such as bits of inorganic matter and organic, though unorganized, particles, so that only a few rain-drops, probably, can be conceived of as including micro-organisms, still less living micro-organisms, at the start. Again, it must not be forgotten that even if we assume the presence of some living micro-organisms in rain-drops, these are doubtless, with the rarest exceptions, saphrophytic and not pathogenic. Our present knowledge of the behavior of pathogenic germs in the air is very limited, and this is particularly the case with those diseases, such as typhoid fever and Asiatic cholera, which are conspicuously water-borne. Granting, however, the possibility of their presence in air, and the possible concurrence of soluble organic particles, it is obvious that a drop of such naturally distilled water may become polluted and even infected from its very birth. As it falls into the lower layers of the atmosphere, richer in dust, the chance of such pollution must necessarily increase *pari passu*. The *possibility* of such atmospheric contamination of water, and even of its infection, must never be forgotten, but yet cannot be regarded, in the present state of our knowledge, except in very rare and unusual cases, as important.

The Pollution of Rain-water and Snow by Dust.—The phenomena afforded by snow deserve especial, though brief, mention in this connection. A snowflake, especially if moist, appears to be a kind of filter through which a relatively large amount of air passes as the snowflake falls ; and this peculiarity of structure doubtless explains the fact that snow, particularly that first to fall, is often really dirty and

rich in micro-organisms ; while, at the same time, the atmosphere after a prolonged snow-fall is bacterially, as well as to the senses, noticeably purified. It follows as a matter of course that melted snow or snow-water—and, we may add, snow-ice—is far from pure ; and that the water derived from melted snow in periods of " thaw " is not, as it might be supposed to be, particularly pure. On the contrary, the author observed on one occasion, when a sudden thaw had poured vast quantities of such water into the Merrimac River, the largest number of bacteria he ever discovered in the city water of Lowell, viz : 33,000 per cubic centimetre—a number far in excess of that observed when the spring freshets had polluted the river, or even in summer, when the proportion of sewage to other waters in the river is highest.

If, however, proof were needed that typhoid fever and other diarrhœal diseases can be conveyed otherwise than by water supplies drawn through or over the earth, it would be enough to mention those places, such as Bermuda, where water is obtained for drinking only from cisterns or cemented basins on the hills, in which rain-water only is collected, and where, nevertheless, typhoid fever is by no means unknown either among the troops or the citizens.

Influence of the Earth upon the Purity of Rain-water.—Once the rain-drop, alone or combined with others, touches the surface of the earth or its appendages—such as rocks, trees, roofs, fences, haystacks, animals—it meets, almost immediately, abundant dust or dirt, including matters organic and inorganic, soluble and insoluble, living and lifeless. As it rolls over the dusty rock alone, or with others forming a trickling stream, it naturally dissolves some substances and sweeps on others mechanically—its departure from purity increasing as it proceeds. If it wears away the soil, enough of the latter may be carried along to make it discolored or even muddy, no chemical analysis of such water being needed to show its pollution, while bacterially it is charged with thousands of micro-organisms in every cubic centimetre. This is its horizontal, or surface-displacement history. If,

on the contrary, the rain-drop falls upon porous, absorbent earth, not already water-logged, it will sink by gravity, possibly also by capillarity, or by the push of other particles from behind, down into the spongy earth. This will be a vertical displacement ; and here, also, it will as a rule come into contact with matters organic and inorganic, soluble and insoluble, living and lifeless. Whether its alighting place be sand or soil, it will usually find the porous earthy particles mantled with bacterial jelly, dead or alive, wet or dry. And immediately, actions and reactions, physical and chemical, will begin, and continue until a new condition has arisen. Water that thus on touching the earth takes the vertical direction is commonly called " ground " water; while that which moves off more or less horizontally is called " surface " water. Both, it will be observed are comparatively impure when they arrive on the earth ; that is to say, they consist of pure water holding in solution and suspension certain organic and inorganic, living and lifeless, substances derived from the atmosphere.

This is perhaps the best place to remark that the terms "pure " and " impure " are relative only. We have thus far used these terms in the chemical sense, yet, in another sense rain-water is remarkably pure. We may allow the popular meaning and still keep in mind the fact that rain-water, from the chemical and bacterial point of view, is of relative purity only. From this point onwards, it will be convenient if we consider separately the two great classes of natural waters, namely, " ground " waters and " surface " waters.

Rain-water and the Living Earth. Ground Waters and their Pollution and Purification.—Rain-water on entering porous earth (either sand or soil open or close in texture) is at once brought under new conditions and into close contact with swarming bacterial life. The earth is the home of the bacteria. They are found in the air,—but only because they have been lifted into it by winds, in the form of dried earth or dust. They are found in water—in streams, lakes, and the sea—but seldom in density of population at all com-

parable to that existing in the surface layers of the earth. The reason for this seems to be that at the surface of the earth bacteria secure at the same time oxygen, moisture, and food—the most favorable conditions for their life. It appears to be very doubtful if bacteria are pre-eminently aquatic. Many species at any rate seem to inhabit the surface layers of the earth and if, as appears to be the case, they are essentially and preferably terrestial, this, as we shall see, is a matter of great consequence in the establishment and conservation of the purity of waters.

The rain-drop sinking into the porous earth, is at once greeted by a hungry population of bacteria mantling the sand grains over which it is spread ; and this too, a permanent, not a nomadic population. More or less slowly it sinks through this living, gelatinous layer and as it passes on it is robbed of its suspended organic matters and of some of those in solution. It is also mechanically filtered, no doubt, to some extent, but the main thing is that as a result of its journey, it is so purified in respect to its organic matters that it can no longer support abundant bacterial life. Meanwhile it readily dissolves the end-results and the by-products of the luxuriant bacterial vegetation through which it passes, and becomes the vehicle of nitrates, sulphates, and other mineral matters. As it sinks lower and lower, it dissolves more and more of such salts and, passing by other resident bacteria, is increasingly purified of organic matters capable of supporting bacterial life. Such water may contain bacteria, but, as abundant experiments have shown, these are relatively few in number and singularly slow of development. Water derived from deep wells is generally poor in bacteria, and even when not poor, is characterized by certain peculiarities which remove it from the category of waters charged with ordinary bacteria. In the case of most ground waters, a high degree of organic purity is established by the natural processes just described, and if such waters be collected in protected springs, wells, or covered reservoirs properly constucted, their organic purity is readily conserved

and they constitute (in such cases) some of the most satisfactory water supplies known.

There are, however, certain conditions which limit the usefulness of "ground" waters. In the first place, while of high organic purity, they may have become so rich in in-organic matters as to belong to the class of "hard" or "mineral" waters—which, by common consent, based upon general experience, places them in the category of undesira-ble waters, inferior for public supplies. Far more important, however, is the fact that such waters are necessarily limited in quantity and, therefore, not often available for great cities. Obviously ground water can occupy only the inter-stices of the earth's crust, and is subject when drawn upon to high friction, and therefore moves with slow velocity, so that from any one point, or from a few, only a limited amount of water, and that at a low rate of flow, can safely be counted upon. Great cities, however, require large amounts of water, and often large quantities within a very short time; so that it is easy to see why, for them, ground waters, will seldom, if ever, be adequate sources of supply.

On the other hand, ground waters may be polluted in-stead of purified by their passage through the earth. If the earth is itself impure or overtaxed from leaky cess-pools, sink-drains, or other sources of foulness, natural purification may give way to unnatural pollution. This is the accepted theory of the pollution of domestic wells. But, in view of the remarkable purifying powers of the earth and the almost total lack of extensive evidence of disease arising from such pollution, the author is strongly of the opinion that the damage done by underground pollution of domestic wells has been greatly exaggerated. Excepting in those rare cases of fissures in the earth which give easy access for pollution from the surface, and excepting pollutions which have come in from the open top, he is, and long has been, very sceptical of much of the damage attributed to domestic wells. It is to be very much feared that more harm has been

done in these cases by throwing investigators off the true scent than by the pollutions themselves, real or imaginary.

Much more serious than pollutions of the soil itself are the dangers of infection of ground waters from workmen within the well itself, such as happened, for example, in the well-known Caterham (Eng.) case reported upon by Dr. Thorne Thorne. In this instance it appeared that the bowel discharges of an incipient or " walking " typhoid patient, a laborer in one of the open wells supplying the towns of Caterham and Red Hill, found direct access to the public water supply, and brought on a severe and widespread epidemic among takers of this ground water supply.

The Conservation of Purity of Ground Waters.—Finally, ground waters have the serious defect, that in order to remain pure after collection, they require to be kept in the dark. The cities of Newton and Brookline, Massachusetts, derive ground water supplies of great organic purity from driven wells in an uninhabited district of the Charles River Valley. But in order to conserve a purity established by natural filtration, these cities have had to build costly covered reservoirs ; because on exposure to the light, ground waters become infested with chlorophyll-bearing micro-scopical organisms (such as diatoms), which in turn support noxious infusorial animals, and give rise, not infrequently, to highly disagreeable and even nauseous tastes and odors, sometimes described by the consumers of the waters as re-sembling " cucumbers," " fish-oils," " pig-pens," etc. The con-servation of the purity of ground waters thus becomes a matter requiring expert treatment.

Surface Waters and their Pollution.—Let us now turn to that class which we have called " surface " waters, and have described as characterized by a more or less horizontal movement of their particles after these have fallen upon the earth. In this case, the water which falls upon the surface, more or less impure from ærial pollution, instead of being subjected immediately to a progressive purification by sink-ing into the earth, moves along the surface of the earth,

which it erodes, growing in volume as it proceeds, and form-
ing rills, rivulets, or larger streams—brooks, creeks, and
rivers—which still continue to move along the earth's sur-
face, exposed to all sorts of pollution, until they pause for a
longer or shorter time in ponds and lakes, or finally join the
sea.   The area over which this process goes on is called a
" water-shed," and much of the water which falls as rain or
snow is thus shed off, as from a roof, without ever having
soaked into the porous, purifying earth.   But it would be a
mistake to suppose that the entire volume of brooks, rivers,
and lakes has thus been shed off.   The greater part, even of
the so-called " surface " waters, except in times of freshet
due to sudden thaws or to heavy and prolonged rain, is
really ground water, purified by a shorter or longer passage
through the porous earth.   It cannot be too strongly em-
phasized that a very large portion of the water of all rivers,
even of those most polluted, is highly purified ground water ;
and this serves well to show how very impure the really
surface-water portion of such streams must be.   Other
things equal, a water derived from a quick-spilling water-
shed must always be relatively impure and dangerous, be-
cause to the natural impurities of rain-water have been
added the surface impurities of the earth, violently detached
and rapidly conveyed.   It will appear, therefore, already,
that the problem of the establishment of purity of surface
water is by no means easy.   At first sight it would seem
that the larger a river is the more polluted it must be ; for
it has the longer been exposed to the thousand sources of
pollution on its shores and from its tributaries, while as it
flows no obvious sources of purification exist.   A river is at
first sight like a great *vena cava*, receiving a host of tributary
veins, each of which has simply drained its own area ; or
like a drain, receiving drainage from a thousand lesser
drains.

   The " Self-Purification" of Streams.—How then, we may
well ask, did it ever happen that many well regulated
American cities, some of them of large size, have in the

past drawn their water supplies from polluted rivers or lakes, not heedlessly, but on the advice of the ablest engineers and sanitarians of the day? The answer is that these engineers, in common with the best sanitarians of the time, trusted to a theory of the establishment of purity in surface waters, which we now know to have been only a half-truth and utterly untenable—namely, the theory of " self-purification " of streams. In substance this theory was, that " running water purifies itself." It was based on the obvious fact that a stream befouled at a certain point often shows no visible sign of such defilement at points some distance below. It was powerfully supported, however, and seemingly established as a law of nature, by the chemistry of the day, which appeared to show, in correspondence with the evidence of the senses, that there was actually less organic matter at the lower than at the higher point. Here, plainly, was actual scientific proof of purification—or what seemed to be such. Acting on this theory, many cities—and some of them great cities—in America and elsewhere, introduced water supplies from polluted streams, relying simply upon the self-purifying power of running water to destroy the pollutions known to be poured into the streams at points above.

To-day we realize that this theory is only half true, and that such self-purification is only partial and absolutely unreliable. By a curious reversal of scientific opinion, we now hold that it is precisely " running " water which is least likely to purify itself, while stagnant (standing) water—formerly looked upon with dread and suspicion,—is now in high favor. The old theory was in vogue long enough to enable us to make a wonderful series of experiments, and on a stupendous scale ; experiments in which whole cities confidingly drank for years sewage-polluted waters, often with sad results, yet results of lasting value to mankind. Never again, so long as civilization endures will intelligent communities, acting under expert advice, need to repeat these experiments. The lesson has been painful and costly, but it has been learned and will

never be forgotten.   The source of error in the earlier prac-
tice was neglect of the factor of dilution and the assignment
as due to true purification and actual chemical change of
what was really for the most part dilution by ground water,
which, as I have said, not only forms a large proportion
of the volume of most rivers, but also brings to them
water of a high degree of organic purity.   In so far as a
mixture of pure water with foul water can purify the latter,
there is truly a marked "self-purification" of rivers.   There
is even more than this in fact, for some of the pathogenetic
elements disappear *en route* from cold, or inanition or by en-
tanglement, or by falling to the bottom, or by the germicidal
influence of light, or from other conditions, all of which may
be summed up in the words "unfavorable environment."
But, obviously, the more rapid the stream, the less these
conditions of whatever kind can act, and the more certain
the damage done below.

Quiet Water—Not Running Water—Purifies Itself.—It is
therefore not so true that "running" water, as that quiet
water, purifies itself.   We may even go so far as to say that
the first requirement for the natural establishment of purity
in surface waters is *quiescence*.   But quiescence in rivers is
ordinarily impossible.   Hence the establishment and con-
servation of purity in flowing rivers is to-day regarded, as
by natural means, impossible ; and no river, unless from an
absolutely uninhabited watershed, is to be regarded as suit-
able for direct use as a public water supply.   Such supplies
as, for example, that of Philadelphia, are simply anachronistic,
and absolutely out of date.

Natural Processes of Water Purification.—Fortunately there
exist, nevertheless, purely natural processes by which the
water of even polluted rivers, though not the rivers them-
selves, can be readily purified on a large scale ; and it follows
that such streams may become available, though, of course,
never directly, as valuable sources of water supply, even for
great cities.   The time has forever gone by when a city or
town can honestly pump the water of an ordinary river at its

doors directly to its citizens, without any previous purification. On the other hand, we probably understand to-day better than ever before the nature of the processes required to effect the purification which is so indispensable. In fact, we have abundant and positive evidence, not only from the data afforded by the bacteriology of natural waters, but also from the actual experience of cities that have used such waters, that there are purely natural processes available, which under certain conditions are capable of producing a high degree of purification of polluted surface waters. These processes are of great scientific as well as practical interest, and well deserve our careful, if necessarily brief, consideration. We may dwell accordingly first, upon the purification effected by simple quiescence, as this is obtained in Nature in lakes and ponds, and as it can be effected, even for rivers, by *storage*.

A case of this kind with which the author is familiar, and one which seems to him at once specially instructive and thoroughly practical, is that afforded by the public water supply of Burlington, Vt. Burlington is the only city in New England which derives its water supply from the same lake into which it empties its sewage,—although this arrangement for water supply and sewage disposal is common enough in other parts of the United States, such as Chicago, Milwaukee, Duluth, Buffalo, Cleveland, and in Toronto, Canada. Burlington is situated at the eastern extremity of a broad bay on Lake Champlain, and when in 1866, the citizens determined to have an ample public water supply for fire and other purposes, they naturally turned first of all, as they did finally, to Lake Champlain. The water-works were built in 1867, the intake being located on the lake front, near the northern extremity of the docks. For some years the water supply gave entire satisfaction, and in 1870, the Health Officer reported that at no time had the city water supply held so high a place in the public estimation. When sewers were put in, the trunk sewer carrying most of the sewage of the city was made to empty into the lake

about one-half mile south of the water intake, and although
there was gradually an increasing conviction, based upon the
evidence drawn from the prevalence of diarrhœa and dysen-
tery, with a small amount of typhoid fever, that things were
not altogether satisfactory, matters did not become bad
enough to cause the removal of the sewer outfall to a more
remote point until 1885, when it was carried to a place one
mile, instead of one-half mile, away from the intake of the
water works.   Meantime the city had increased in population
and the sewer connections with dwellings had multiplied ;
but even as late as 1892, while strongly disapproving of the
local conditions, and urging most emphatically a change in
them, the author himself, after a very careful investigation,
was forced to conclude, in a report to the city officials, that
so great was the purification accomplished by this one mile
of lake quiescence that there was no immediate reason for
excessive anxiety or alarm for the sanitary condition of the
water supply.   He said among other things, "the results
show conclusively that the mortality from typhoid fever, and
the same is true for diarrhœa and dysentery, has not been
large in Burlington during the last twelve years.   The aver-
age annual mortality from typhoid fever from 1870 to 1891,
was 3.57 per 10,000 inhabitants."   He then went on to show
that Burlington compared favorably in this respect with
many cities having water supplies of undoubted purity, and
stated that in respect to mortality from typhoid fever it had
a better record than many cities having water supplies of
good reputation.   He added, that during the past three
years, he had repeatedly made bacteriological analyses of the
Burlington supply, and had found no satisfactory evidence
of the presence of sewage in the drinking water.   In spite of
these facts, however, he urged that the location of the intake
of the water works, as near as it was to the main sewer of
the city, was highly objectionable if not positively danger-
ous, and that he regarded it as a constant menace to the
sanitary welfare of the city.

Now how had it happened that such extensive befouling

of the lake front, only a mile, and for some years only one-
half mile from the intake of the drinking water of the city,
had done so little harm? The answer is that here, pre-
cisely as in many rivers that were formerly supposed to
have purified themselves by "running" or exposure to free
oxygen,—*dilution* with pure water did much; and, unlike
the case of the rivers, *quiescence* did even more. Bacterial
analyses showed that at the sewer outfall the numbers of
bacteria were millions, and of clearly marked sewage charac-
teristics. But at points one hundred feet away ninety per
cent. of these had disappeared, and at one thousand feet
many more. At the distance of half a mile nearly all trace
of sewage had disappeared, and a mile away no evidence of
it could be found. It should not fail to be stated that in
the bay there are no regular currents, but only wind cur-
rents setting sometimes in one direction, sometimes in
another; and that the amount of sewage poured in from a
city of the size of Burlington is not very large, as it has, or
then had, only about 15,000 inhabitants. Furthermore, the
sewer outfall opened into a small pocket or basin of its own,
where lively fermentation went on in summer; and this was
an added purifying agency, though dwellers in the neighbor-
hood bitterly complained at times of the evil smells arising
from this little basin. The fact, however, that in this pocket
the sewage lingered quietly for a time, and fermented more
or less, was undoubtedly favorable to its purification. When,
a year or two later, it was determined to do away with this
basin, the citizens were warned of the added danger involved,
and finally were persuaded to carry the intake pipe of their
water works three miles out into the purer waters of the
broad lake. It is certainly a remarkable, unexpected, and
highly important fact, that under certain conditions a city
or town—but always one of small size only—may safely drain
into, and drink from, the same lake—a condition which has
been described as drinking from the other side of its own cess-
pool. This is, in fact, what is done by such cities as Duluth,
Cleveland, Chicago, and Milwaukee; but it is important to

remember that it can be done with safety only by *small* communities, for the reason that the greater the city the nearer we come to a quick rotation—a river of sewage flowing out, a river of water flowing in;—and the danger of contamination here increases with the volumes.   If it increases so far as to do away with sufficient *quiescence*, we have once more essentially a stream, and running water does not effectively purify itself—it mainly undergoes dilution.

Purification by Storage.—Conversely, if a running water such as we have in a river can be converted into a quiet water,—as in a reservoir—just such purification as we have discovered in Burlington may result.   This is, indeed, what takes place, fortunately, with water derived from polluted water-sheds and stored in huge reservoirs :—great and often adequate purification may be established by *quiescence* or storage.   There is every reason to believe that the principles involved in the purification which goes on in Burlington are typical in whole or in part of many other similar cases. Some bacteria perish directly in the cold water of the lake ; some settle to the bottom and perish there ; some are killed by light as they float on the surface ; some are devoured by predatory infusoria ; the more hardy survive, perhaps, but do not multiply extensively because of lack of food and other unfavoring conditions, and so are simply scattered by dilution ; until finally only those remain which can permanently thrive in the now relatively pure water ; and these are apparently mostly harmless.

Purification by Slow Sand Filtration.—It follows as a matter of course, from what has now been said, that if a city or town must use a river as its source of supply, it must ordinarily first purify it either by natural or by artificial means.   One of the natural processes available has already been described and may be summarily characterized as *quiescence* effected by *storage*.   Another process may be defined as "natural filtration."   Thanks to the labors of the State Board of Health of Massachusetts and to the intelligence of the people of that State who have supplied

the necessary funds to carry on what is perhaps the most elaborate and costly series of experiments ever undertaken in the interests of sanitary science, we are to-day in full possession of the data which enable us to define with certainty the natural laws governing the artificial purification of surface waters by simple sand filtration. These are now a matter of common knowledge among experts and there-fore, especially as much time would be required for their full explanation, need not be dwelt upon at great length at this point. Stated in a few words, we may say that the process of purification by " natural filtration " is accomplished pre-cisely as with the rainfall on porous earth. Land of porous texture is first prepared, sand having been found best for the purpose, and in the best practice specially constructed " areas " or " beds " of sand are made and then thoroughly underdrained, so as to facilitate the collection of the purified water. The water to be purified is allowed to run over the surface and find its way down through the open porous sand. Very soon, however, bacteria take up their residence on the sand grains especially near the top, bacterial jelly ac-cumulates and a purifying mechanism or organism of great efficiency results. If this mechanism be operated intermit-tently, air passes into the interstices of the sand, precisely as into ordinary earth, only more freely ; and some of the organic matters are removed by nitrification, that is by com-plete conversion into mineral matter. In this case also, the bacterial jelly forms further down in the sand and makes an effective purifying medium. Innumerable tests of such mechanisms as this have been made and their high efficiency shown. They are usually called sand " filters " but the name is unfortunate as implying something artificial rather than natural. The process is in fact, nearly if not exactly the same as in the purifying of surface waters which pass through earth and become ground waters ; although by selecting the porous materials, " hardness " and some other faults of ground water are avoided. It is by such means that London, Hamburg, Berlin, and in our own country Lawrence,

in Massachusetts, secure from polluted surface waters satis-
factory and sanitary supplies.   Albany is following in their
footsteps, and Philadelphia and many other American cities
must probably do likewise.   For the establishment of purity
in surface waters, we have, then, two important and natural
processes, *quiescence*, or *storage*, and *bacterial action* or
" sand filtration."

Artificial Processes of Purification of Water Supplies.—
Various attempts have been made to substitute artificial for
natural processes of purification of water supplies and, under
certain circumstances, there can be no question of the
importance and value of these procedures.   The only pro-
cesses of this character thus far seriously proposed are those
known in America as processes of " mechanical " filtration
for which the advantages are claimed of, first, hygienic
efficiency ; second, rapidity ; third, decolorization ; fourth,
convenience of installation ; fifth, cheapness.   The principles
involved in mechanical filtration are comparatively simple,
and are substantially as follows :—A chemical re-agent of
harmless character such as alumina is added to the water to
be purified in a certain small proportion, yet sufficient to
produce, if the reaction of the water be right, a flocculent
precipitate.   If the water were kept quiet and allowed to
stand this precipitate would entangle and carry to the bottom
a large amount of the suspended matters present, including
the bacteria.   In fact, however, this is not found to be
necessary, but after the formation of the precipitate the
water is rapidly passed through a sand filter upon the surface
of which the flocculent precipitate mentioned quickly collects
and forms a layer which more or less effectually detains
suspended matters, including the bacteria, and removes from
the water a large amount of any color which it may contain.
Mechanical appliances, such as the reversal of the stream,
allow for the washing of the sand filters and the repetition
of the process, which may obviously be carried on rapidly
and therefore upon a comparatively small area.

Rapid Mechanical Filters.—Tests of the hygienic efficiency

of rapid mechanical filters have until recently been for the most part wanting, but experiments now under way at Louisville Kentucky, Cincinnati Ohio, and Pittsburgh Pennsylvania, promise to throw much needed light upon the subject.[1]

Conservation of Purity in Surface Waters.—Enough has been said to show that the natural establishment of purity in water supplies is a process somewhat elaborate and complicated. The conservation of the purity of ground waters, when once collected, has already been shown to be a matter requiring intelligent supervision. The same thing is even more true of surface waters, especially those required for great cities. If after collection, these waters are stored in huge reservoirs, rich in organic matter (as is usually the case) they not infrequently become infested with microscopical organisms, which generate in them disagreeable, and sometimes even nauseous, tastes and odors, of which the consumers bitterly and very properly complain. The supply of New York City is collected from water-sheds by no means uninhabited, and is in many respects well purified by storage. Until very recently, however, it has not been thought necessary, even if it is to-day, in this vicinity, to remove all possible organic matter from the storage basins or reservoirs employed. The latest and best practice, however, is exemplified by the huge Metropolitan Water Supply for Boston and the twenty-eight cities and towns in its immediate vicinity. There the great Wachusett reservoir, which alone is to cost nine millions of dollars, is being carefully prepared, by the removal of all peat, muck, stumps, loam, and other organic matter, from the sides and bottom of the reservoir, in order that organic matters may be wanting for the support of these same microscopical organisms during

[1] Since this lecture was delivered Reports have appeared upon all of these experiments, namely, upon the Purification of the Ohio River at Louisville and at Cincinnati by George W. Fuller and others, and at Pittsburgh by Allen Hazen and others connected with the Filtration Commission of the city of Pittsburgh. Those interested in this subject are referred to these Reports.

storage.   For this specific purpose of " stripping," as it is
called, it is estimated that three and one half millions of dol-
lars will be spent.   In this case, which probably represents
the very latest ideas in the establishment and conservation
of purity in surface waters, great pains are being taken:

1st. To secure water originally of high organic purity.

2d. To keep the water-shed as uninhabited as possible.

3d. To purify the water collected, by long *quiescence*
effected by *storage* in a huge reservoir ; and,

4th. To conserve its purity when this has once been estab-
lished, by having the reservoir as free as possible from
organic matters which might support bacteria and micro-
scopical organisms.

Recapitulation.—Following these lines we may point out
briefly, in review, the practical application of the princi-
ples now laid down, to the water supplies of great cities,
which, as I have shown, must, for the most part, be surface
waters.   The aërial pollutions, if any, may be neglected,
because beyond our control.   But with the principal source
of pollution, the water-shed, it is quite otherwise.   Ob-
viously the water-shed largely determines the character of
the surface water.   The water-shed may be uninhabited or
inhabited, thickly or thinly.   It may consist of swampy,
peaty, or manured soils; or of forests, rocks, and barren
slopes ; or of a mixture of these things ; and upon these
conditions will depend largely the character, purity, and
conservation-capacity of the water collected.   It is rarely
the case that a great city can secure for its water supply
a totally uninhabited water-shed, or one free from swamps or
other accumulations of organic matter.   Where a choice is
possible, it should as far as practicable do this.   In the ideal
system of surface water supply, the city should own the en-
tire water-shed, and keep it clean and uninhabited.   But if,
as will usually be the case, the water-shed is more or less in-
habited and swampy, pains must be taken to guard against
specific pollutions from habitations and to drain swamps, so

as to collect the rainfall from the former as slowly, and from the latter as quickly, as possible. For all the details of these matters, the most intelligent and educated sanitary supervision is required ; a supervision now almost wholly lacking in the administration of the water supplies of our great cities. This is the place for young sanitary engineers, who, as a careful scientific patrol, should be employed, not occasionally or spasmodically, but regularly and permanently, to guard the sanitary condition of the water-shed. To bring about even the possibility of this, special legislation may be necessary ; as for example was found to be the case in Massachusetts where formerly the law did not allow any city or town, or any sanitary authority on their complaint, to abate nuisances or remove sources of pollution upon any part of the water-shed from which it derived its drinking water. Afterwards a statute was enacted, making it possible, by due process of law, for the State Board of Health (on complaint) to remove sources of pollution " within the distance of one hundred feet of the high-water mark of any stream or pond, or any stream, pond, spring, or water-course tributary thereto, polluting or tending to pollute such stream, pond, spring, or water course."

Protection of Purity of Inland Waters in Massachusetts.— The growth of legislation towards the better control, or sanitary protection, of water-sheds is interesting and instructive, as it is laid down for example, in the Massachusetts statutes.

Previous to 1878, there was apparently no attempt to guard against pollution of water supplies, still less of the water-sheds from which they were derived, but in that year, it was made illegal to discharge into any stream or pond used as a source of water supply, polluting material within twenty miles above the point where the supply was stationed. We see here embodied in legislation the influence of the old theory of " self-purification "—twenty miles being regarded as an ample distance within which a stream might be trusted to purify itself. In 1879, it was made illegal to

deposit excrement or foul or decaying matter in any water used for domestic water supply on or upon the shore thereof within five rods of the water; but it was also specially pro-vided that this act should not be construed to interfere with the putting in of the sewage of a city, town, or public insti-tution, or to prevent boating, bathing, or fishing, or the en-riching of land for agricultural purposes.   It was not until 1890, that any legislation of a thoroughly modern sort, in harmony with the sanitary science of the day was enacted, and this was of the limited description already referred to,—inasmuch as it restricted the powers of the State Board of Health, as a sanitary authority to be appealed to, to the limit of one hundred feet from the high-water mark of any street or pond, or any tributary of the same.   This, of course, was a distinct advance ; but with the inaugura-tion of the Metropolitan Water Supply for Boston and vicinity, special legislation was secured for that area, which provided *absolute control* by the State Board of Health over the sanitary condition of the *entire water-sheds* which it was proposed to use.

Sanitary Protection of Public Water Supplies.—In Chapter 488 of the Acts of the General Assembly of Massachusetts for the year 1895, to provide for a Metropolitan Water Supply, an advanced position was taken in regard to the sanitary protection of water in the following section :

SANITARY PROTECTION OF WATER.

SECTION 24.   The State Board of Health is hereby author-ized and required to make rules and regulations for the san-tary protection of all waters used by the Metropolitan Water Board for the water supply of any city, town, or water company aforesaid.   .   .   .

ENFORCEMENT.

SECTION 27.   Said Metropolitan Water Board and their employees designated for the purpose, shall enforce the pro-visions of this Act, and of the rules, regulations and orders

made thereunder, and may enter into any building, and upon any land, for the purpose of ascertaining whether sources of pollution there exist, and whether the provisions of this Act and of the rules, regulations and orders made as aforesaid are complied with.   .   .   .

In 1897 what was practically the same authority was granted to the State Board of Health, covering all water-sheds within the State of Massachusetts tributary to public water supplies, in the shape of an Act, Chapter 510, Acts of 1897, which reads as follows and probably represents as nearly as can be expected in conservative legislation, the best ideas of the sanitary science of to-day.

ACTS OF 1897.   CHAPTER 510.

An Act relative to the Pollution of Sources of Water Supply.

Be it enacted, etc., as follows :

SECTION 1.   The State Board of Health shall have the general supervision of, and have authority, from time to time, as it may deem expedient, to examine all streams and ponds used by any city, town, or water or ice company in this Commonwealth as sources of water supply, together with all springs, streams, and water-courses tributary thereto, with reference to their purity, and shall have authority to make rules, regulations and orders for the purpose of pre-venting the pollution, and securing the sanitary protection of the same.

SECTION 2.   Said Board shall appoint such agents and servants as it may deem necessary, who shall attend to the enforcement of the provisions of this act and of the rules, regulations and orders thereunder, and shall have the power, by such agents and servants as aforesaid, to enter into and upon any building structure and premises for the purpose of ascertaining whether or not any sources of pollution or danger to the water supply there exist, and whether or not

the provisions of this act and the rules, regulations and orders made as aforesaid are complied with and obeyed. . .

SECTION 3. Upon complaint to said State Board of Health by the mayor of a city or the selectmen of a town, or by a board of water commissioners, or by the president of a water or ice company, that manure, excrement, garbage, sewage or any other matter is so deposited, kept or discharged as to pollute or tend to pollute the waters of any stream, pond, spring or water course used by a city, town, water or ice company as a source of water supply, or that any other cause of pollution to such water supplies exists, the said Board of Health shall appoint a time and place for hearing parties to be affected, and give due notice thereof to such parties; and after such hearing, if in its judgment the public health requires, it shall prohibit the deposit, keeping, or discharge of any such material, or other cause of pollution as aforesaid, and shall order any person to desist therefrom and to remove any such material theretofore deposited, or other cause of pollution; but said Board shall not prohibit the cultivation and use of the soil in the ordinary methods of agriculture, provided that no human excrement is used thereon. But said Board shall not prohibit the use of any structure which was in existence at the time of the passage of this act, in case the complaint referring to or including such structure is made by the board of water commissioners or any city or town, or by any water or ice company, unless the board of water commissioners or the water or ice company making the complaint shall file with the said State Board of Health an order or vote of its city council, selectmen or water or ice company respectively, to the effect that such city, town, or water or ice company will, at its own expense, make such changes in said structure or its location as said Board shall deem expedient. Such order or vote shall be binding on such city, town, or water or ice company; and, when such changes shall have been made, all damages occasioned thereby shall be paid by such city, town, or water or ice company; and if the parties cannot

agree thereon such damages shall be determined by a jury on petition of either party, filed in the clerk's office of the superior court in the county where the premises are located, in the manner provided by law in relation to determining the damages occasioned by taking land for highways in such city or town, or in the case of a water or ice company, in the city or town in which said structure is located.   .   .   .

SECTION 6. Whoever does any of the acts herein prohibited or violates or refuses to comply with any rule, regulation or order made under the authority of this act shall be punished for each offence by a fine not exceeding five hundred dollars, to be paid to the Commonwealth, or by imprisonment not exceeding one year in the House of Correction, or by both such fine and imprisonment.

This law was secured only after it had been found that, under previous legislation which had established a hundred-foot limit, it was quite impossible adequately to protect Massachusetts water-sheds from pollution, and that blackmail also was liable to occur under the former law.

Sanitary Protection and Inspection of Water-Sheds.—Of late years it has been also learned, at least in Massachussetts, that serious pollutions may occur to surface supplies, similar to that which affected the ground-water supply of Caterham, by the temporary residence on the water-shed of thousands of laborers, some of whom may be walking cases of infectious disease. Two examples of this kind have occurred within my own experience.

The first was several years ago, when a new reservoir of great size was under construction for a large and important American city. When finished it was to be connected with and added to an existing system of reservoirs, and during the work of stripping off the loam and building the dam large gangs of men were, of course, employed. The stream which was to be dammed naturally ran through the valley where these men worked, and on into the lower reservoirs

constituting the then existing supply of the city. An epidemic of typhoid fever broke out among these laborers. I was called in to study the cause of the epidemic, but I very soon saw that, valuable as that study might be from the ætiological point of view, the possible effects of the epidemic were practically far more important and pressing. I went there to find the cause of the typhoid fever, but this question had to wait, as soon as I saw the state of affairs, while I tried to prevent the typhoid germs produced by the people who were working on the brook and using it as their sewer from reaching the consumers of the water below. There were hundreds of men at work, and quite a number of them were suffering with typhoid fever, and all were about or very near the brook. Many of them were visibly using it as a drain and a defœcating place, and were defiling the shores of the brook at many points from which material during a sudden shower was readily washed into the brook and conveyed to the reservoirs. Fortunately the system of reservoirs allowed the nearest one to be disconnected for a time. The purifying effects of quiescence and storage were called in. The water-shed was cleaned up, disinfection was employed, and every possible precaution taken to prevent further trouble. I am happy to say that our efforts were entirely successful.

The other case was very similar. Another large city was building a huge storage reservoir. Two thousand laborers were employed and lived upon the water-shed, close to the stream which was to be dammed up. Typhoid fever broke out among them. They were very ignorant, and even when closely watched persisted in washing their soiled clothing in the brook which ran down into the city supply below. Extraordinary pains had to be taken to make sure that the purity of this infected supply was re-established and conserved before it was delivered to the consumers. The chief responsibility in this case, also, fell upon me, and I am happy to say that my efforts were successful.

Still another lately recognized source of pollution of water-

sheds is their use for picnic purposes and summer resorts. Some two years ago the attention of the State Board of Health of Massachusetts was called to this subject, and I had the privilege of supervising a general investigation of the sanitary condition of all the picnic and summer resorts of the State, but especially those located on the water-sheds of public water supplies, with a view to learning the character and extent of the pollutions, if any. The results showed that in many cases dangerous pollutions existed upon the water-sheds, seriously imperilling the purity of the supplies with which they were connected. In the following year the work was repeated, with equally satisfactory results. The development of electric street railway systems has, at least in Massachusetts, caused many new "resorts" to spring up in out-of-the-way places (often chosen largely because of their isolation and wildness), and in not a few cases on or near lakes and reservoirs used for water supplies, or upon their water-sheds.

Far more serious, of course, are those instances in which villages or towns are situated within or upon the water-shed. These cases often require the most careful study and supervision. Sometimes it is necessary and possible to divert their drainage from the water-shed; sometimes, when this is impracticable, it can be purified on a sewage farm within the water-shed; sometimes other procedures are required. Here again intelligent supervision and control are required, which must be permanent, inasmuch as the conditions on the water-shed are subject to frequent and often unexpected change. Few American cities, if any, have to-day such supervision as the standards of modern science demand. It is not enough to burn a few barns occasionally on the water-shed, or to purchase and remove a few pig-pens. The problem is larger than this, and requires thoughtful, enlightened, and continuous public service for its proper amelioration.

After the careful collection of the water from the water-shed, it should be subjected to one or the other, or both, of

the two great methods of natural purification—storage or filtration—in order to correct whatever defects it may still have. If it be a ground water, further filtration is generally needless, but its storage must be effected in the absence of light. If it be a surface water, it should without question be stored for a time and, when possible, in well-stripped reservoirs—*i. e.*, in reservoirs freed from organic matters.

Lowell, you will remember, recommends " old books to read, old wine to drink, old wood to burn." We moderns have discovered, in addition, that old water is better than new. It is said that formerly sea captains seldom allowed any water to be used on board ship that had not been in the casks for some months. Their theory was that, like wine, it underwent a working or fermentation which improved its quality. We know that they were right, and, better, we know why: harmful bacteria had thus had time to die out.

If a surface water is known to be much polluted when collected, the more difficult and more heroic treatment of filtration should be invoked. London stores first and then filters, with excellent results. Hamburg does the reverse, and so does Lawrence. When practicable, storage both before and after filtration is desirable.

Expert Supervision an Absolute Requirement of Modern Sanitation.—Here again in any particular case experience and judgment are required. The keynote of public service is expert supervision. With this remark we may return to the point from which we started. If a public supply is to be made a public safeguard, it must be scientifically and skilfully, as well as economically, administered. It will not do to leave to the shifty devices of small politicians matters like water supply, gas supply, and food supply, which require, for mere public safety, skilled and highly-paid supervision. If our republic is to endure and to exemplify a form of civilization above that of the republics of Central America, in which plunder and bad government are the rule, we shall have to see to it in the near future that in the place of small

politicians to manage these things, we have educated public servants ; instead of ignoramuses in charge of our watersheds, we must have men technically trained ; and instead of bosses and heelers to deal with these problems in their larger aspects, faithful and able experts.   Only on this condition can we afford to surrender private supervision of some of the principal avenues of our well-being for public supervision ;—and until the most expert public supervision attainable takes the place of private control, it will remain true that a public supply is a public danger.

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